IccWare

for

Windows 95, 98, Me, NT & 2000

Version 3.0

User Manual

Software for Life Cycle Cost Calculations

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Introduction

LccWare is a software product that calculates the life cycle cost of a system. This manual describes the facilities in lccWare and explains how you can use the software.

The first section provides an overview of the main aspects of the product and explains the terminology used throughout the manual.

The second section explains the menu commands that are available in lccWare.

The third section explains the layout and functionality of the main window in lccWare.

The fourth section describes the main dialogs that you will encounter in lccWare.

The fifth section is a tutorial that leads you through the development of a simple life cycle cost model in lccWare. The tutorial explains the main facilities in the software and will give you an understanding of the philosophy behind the product.

The sixth section is made up of several subsections, each of which tells you how to achieve various goals in lccWare.

The next two sections deal with import/export and report generation facilities.

Finally there are a set of Appendices that give you detailed information on lccWare database structure, the steps in the lccWare calculation process and a glossary of terms.

What's New in Version 3

Security

The lccWare project can (optionally) be protected by 4 levels of user security - administrative, design, modify or read. lccWare users may (optionally) be granted one of these 4 levels.

The ‘read’ user may examine the lccWare project and it’s data.

The ‘modify’ user may in addition modify lccWare project data (but not the structure or cost functions).

The ‘design’ user may in addition design lccWare projects.

The administrative user may in addition add and delete users, and set their passwords.

Sensitivity Analysis

Any number of sensitivity studies may be carried out on constant and time dependent global variables, and constant and time dependent local variables. The sensitivity variation may be specified as a percentage of, or as an offset to, the normal value. In addition it may be specified as an absolute value for constant global variables.

Part Trees

The part trees provide the user with a convenient method of assigning the costs associated with a frequently used piece of equipment to a cost function.

The part trees window allows the user to add as many part trees as required at the top level. Each part tree has any number of constant or time dependent variables associated with it (known as part tree variables).

Below each part tree the user may create a tree structure of parts, as complex or simple as required. Each part has a number of values associated with it, each corresponding to a parent part tree variable (time dependent variable values are dimensioned

according to the number of time sequences and the number of time points per time sequence). The user enters data values for each part/variable combination.

The values from the part trees are included in the cost calculation using a predefined function, PartTreeValue (Part Tree Name, Part Name, Variable Name, Mode). A typical cost function using a part tree value would be:

EngineSparesCost = PartTreeValue (“Car”, ”Engine”, ”SparesCost”, “SUM”)

This is based on a part tree called Car with sub-systems including the Engine (which may itself have many sub-systems). One of the variables is SparesCost. This function call will sum all the values of SparesCost below and including Engine. If the “SUM” argument is changed to “PART” then only the value of SparesCost will be generated.

Library Facility

The library facility allows the user to create many cost structures in a single master library. The library facility is enhanced by the cost category feature: in addition to adding cost nodes to a cost tree the user may also add cost categories. Cost categories are either children of the root node or children of another cost category. The cost category feature allows the user to organise their library in a structured and logical manner.

In addition to creating cost node structures in the library the user may also create part tree structures.

Isograph provide a library already containing the commonly used cost elements. The library may be extended by the user adding their own cost categories, cost nodes, and part trees.

The library window forms part of the main lccWare window. The user may use copy and paste or drag and drop to transfer cost nodes, part trees or parts from the library window to the cost tree or part trees window. All associated information is copied with the selected cost nodes (associated cost and user functions, variables,

part trees etcetera).

Project Wizard

The project wizard simplifies the creation of new projects. The wizard is based on allowing the user to select cost nodes from the master library and creating the new project based on these cost nodes.

The wizard prompts the user for the following information:

Project options – date format, system description, compiled by and approved by.

Number of time sequences and names.

Start date, number of time interval, and the time interval (month or year).

Which cost nodes to copy from the library.

Report Generator, Import and Export

LccWare 3 contains the most recent version of report generator. The latest features include:

- The ability to produce diagram reports of the cost tree, based on the selected cost node or all cost nodes.
- The ability to open alternative report databases and then copy reports from the alternate database to the lccWare database. This allows the user to copy report formats from other Isograph products.
- Unlimited undo and redo of all editing operations.
- An editing tool for the vertical and horizontal alignment of text boxes, graphs and pictures.
- An improved selection mechanism. This is based on the standard Windows selection mechanism. The move and resize functionality has also been improved, along with the introduction of an optional grid.

- The ability to copy text boxes and graphs between reports.
- An SQL query builder to assist in the construction of complex queries using the IccWare database tables.

The most recent version of the export facility includes:

- An export wizard to guide user through export process.
- The ability to export all project data.

The most recent version of the import facility includes:

- An import wizard to guide user through import process.
- The ability to import all project data.
- Automatic matching of IccWare table and field names to the input table and field names when the names are identical.

Improved Copy and Paste between Projects

In IccWare 2.0 it was possible to use drag and drop to cut, copy and paste cost nodes between projects. However only the cost node structure was copied; no associated cost functions or variables associated with the cost functions were copied.

It is now possible to use both drag and drop to move and copy cost nodes between projects, and the *Edit, Copy* and *Paste* menu options to copy cost nodes between projects. The complete set of associated cost functions, variables, user functions, global functions and part trees are also copied. Part trees and parts can also be copied between projects, although only the structure is copied not the part tree variables.

These functions can be used to transfer cost nodes and part trees or parts between any project or library window.

Scrolling Container for Controls

In lccWare 2 controls inside re-sizeable dialogs and windows were clipped in some circumstances when the window was reduced in size. This behaviour has been modified in lccWare 3 so that the window exhibits a scroll bar when a control may otherwise be clipped and/or become invisible.

Indenture Level

The cost node indenture level may be optionally displayed for each cost node in the cost tree. The indenture level is also available as an import, export and report field.

Cost Node Unique Name

The cost node naming scheme has been extended to allow the user to specify a non-unique name for each cost node, in addition to the existing unique name. The lccWare 2.0 cost node *Name* field has been renamed as the *Unique Name* field. A new cost node field, *Name*, has been added, this name may occur one or more times in the cost tree.

When an lccWare 2.0 project is updated to lccWare 3.0 the existing *Name* field is renamed as *Unique Name*, and then the value of the *Unique Name* field copied to the *Name* field for all cost nodes.

Cost Function Code Palette

The lccWare 2.0 cost function code tab used a combo box to categorise variables, functions and operators and a list box to provide a drag and drop facility for copying the variables functions and operators to the cost equation.

This interface has been replaced by the pop-up code palette window. This categorises variables, functions, part tree variables and operators in a tree structure. This has the advantage of providing faster access to the various objects, a larger edit window for the cost equation and an intuitive interface for selecting part

tree variables for inclusion in the cost equation.

Improved Browse Dialog

The *Browse* dialog now displays all variables, functions, part trees, parts and part tree variables in a tree structure. Selecting an item in this tree displays the function or cost node that references the item in a list. Selecting a referenced item from the list allows the user to edit the item directly or, in the case of cost nodes, display the item.

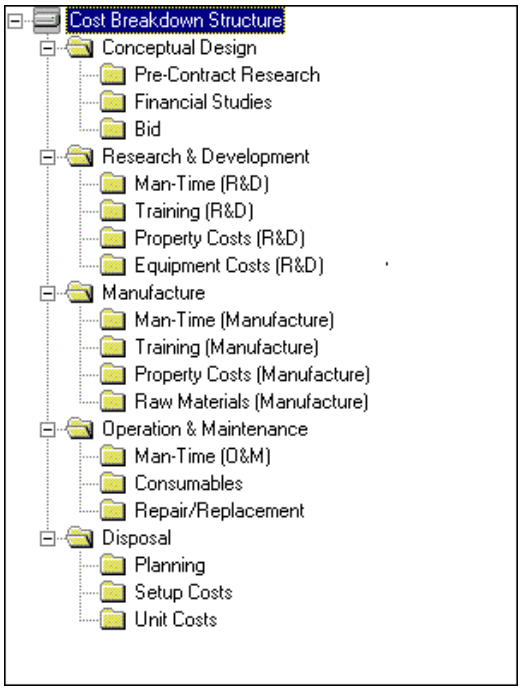
Variable Name Changes Modify References in Functions

Any changes to variable names (global, local or part tree) are now automatically updated in any references in cost, global or user function code.

Overviews

LccWare

LccWare allows you to calculate the life cycle cost of a system. The total cost will be made up of several cost categories that you can define, such as Research & Development, Operation & Maintenance and Disposal. The categories can be further sub-divided to a level at which you can calculate detailed cost values. This division of the total cost into sub-categories is known as the Cost Breakdown Structure (CBS). The CBS is represented in lccWare in the form of a tree.



The nodes on the tree represent the cost elements in the CBS. LccWare allows you the build the tree interactively and create your own CBS.

LccWare allows you to create cost functions that will be used to calculate the value of a cost category. These cost functions can range from simple equations to more complex calculations based on Visual Basic compatible coding.

You can easily assign the cost functions to the nodes on the cost tree so that lccWare can calculate the individual cost values.

The costs are calculated at user defined time points within the life cycle of the system. Each set of time points is called a time sequence and has a unique name. LccWare allows you to define more than one set of time points so that you can investigate the effects of variations in the time point dates and the values of variables at those times.

You can define the variables that you wish to use in the cost calculations and supply values that are either constant over time or vary with time. You can assign values to the time varying variables at each of the time points in each time sequence. Variations may be applied to each of the variables in turn to determine the sensitivity of the study to each variable.

In addition to constant or tabular variables you can create ‘global functions’. For example, these functions could be used to calculate values be used in cost function calculations where a variable can be represented by a function.

LccWare also has the facility to create ‘user functions’. These functions can be assigned to any cost node and can be used to perform ancillary calculations such as the Present Value of a cost. Any number of user functions can be assigned to a single cost node.

When you have instructed lccWare to run a cost calculation you can examine the results in standard text or graph reports. You can also prepare your own reports and save the formats for future use.

LccWare includes facilities for importing data from other software such as Microsoft Access, Microsoft Excel and text files. The software can also export to any of these file formats.

By default lccWare applies no security restrictions to the project databases it creates, however an optional security mechanism

may be activated. When this mechanism is activated all project databases have security information appended. This information determines what operations individual users can perform on the lccWare project. Users are categorised as having either administrator, design, modify or read access.

Time Sequences

A time sequence is the name of a set of time points. LccWare calculates the costs associated with cost nodes on the Cost Breakdown Structure at each time point in a time sequence. Time dependent variables can have different values at each time point in each time sequence, constant variables have the same value at each time point.

Time Points

Time points are the dates at which cost calculations are to be carried out. A set of time points from the beginning to end of a life cycle is known as a time sequence. LccWare calculates the costs associated with cost nodes on the Cost Breakdown Structure at each time point in a time sequence. Time dependent variables can have different values at each time point in each time sequence; constant variables have the same value at each time point.

Global Variables

A global variable is a variable that has a value at each time point in a time sequence and which can be used in any cost function, global function or user function in the lccWare model.

Cost Nodes

Cost nodes represent the cost elements in the cost breakdown structure (CBS). The cost nodes are arranged in a tree structure, with the root node at the top of the tree. Each of the cost nodes has an associated cost function, which is selected by the user from the cost functions available in the project.

When the life cycle cost analysis is performed the cost from the cost function is assigned to the associated cost node, as well as the sum of the costs from the child cost nodes. The analysis proceeds from the bottom of the tree to the top, with the root cost node representing the sum of all the cost node costs.

Part Trees

Part trees provide the user with a convenient method of assigning the costs associated with a frequently used piece of equipment (and its constituent parts) to a cost function.

The part trees window allows the user to add as many part trees as required at the top level. Each part tree has any number of constant or time dependent variables associated with it (known as part tree variables).

Below each part tree the user may create a tree structure of parts, as complex or simple as required. Each part has a number of values associated with it, each corresponding to a parent part tree variable (time dependent variable values are dimensioned according to the number of time sequences and the number of time points per time sequence). The user enters data values for each part/variable combination.

The values from the part trees are included in the cost calculation using a predefined function, PartTreeValue (Part Tree Name, Part Name, Variable Name, Mode). A typical cost function using a part tree value would be:

```
EngineSparesCost =  PartTreeValue (“Car”, ”Engine”,
                                   ”SparesCost”, “SUM”)
```

This is based on a part tree called Car with sub-systems including the Engine (which may itself have many sub-systems). One of the variables is SparesCost. This function call will sum all the values of SparesCost below and including Engine. If the “SUM” argument is changed to “PART” then only the value of SparesCost will be generated.

Cost Functions

A cost function is an equation or Visual Basic compatible function that is used to calculate the cost of a particular node in a cost tree. A cost function can contain global functions, predefined variables, cost node references, local variables, global variables and references to part tree variables. A cost function is evaluated at each time point in a time sequence. Time dependent variables can have different values at each time point in each time sequence. Constant variables have the same value at each time point.

Local Variables

A local variable can only be used with the cost function in which it was originally defined. The cost function can be assigned to any cost node and different values of the local variables could be assigned for each of these instances.

Cost Node References

A cost node reference is the name given to a child cost node, which is then used to represent the cost of the child node in a cost function assigned to the parent cost node. In normal circumstances the cost of a parent node is the sum of the costs of the child nodes. However, lccWare gives you the flexibility to override this in the cost function assigned to the parent node.

Global Functions

Global functions are Visual Basic like functions that can be used to carry out certain operations or calculate values. Global functions can be used in cost or user functions. A set of pre-named global functions is supplied with lccWare that are automatically executed at certain stages of the calculation.

User Functions

User functions are Visual Basic like functions that can be used to carry out certain operations or calculate values. User functions are assigned to cost nodes. An example might be to calculate the 'Present Value' of the cost at the cost node.

Library Facility

Using the Library

The library facility allows the user to create many cost structures in a single master library. The library facility is enhanced by the cost category feature: in addition to adding cost nodes to a cost tree the user may also add cost categories. Cost categories are either children of the root node or children of another cost category. The cost category feature allows the user to organise their library in a structured and logical manner.

In addition to creating cost node structures in the library the user may also create part tree structures.

Isograph provide a library already containing the commonly used cost elements. The library may be extended by the user adding their own cost categories, cost nodes, and part trees.

The library window forms part of the main lccWare window. The user may use copy and paste or drag and drop to transfer cost nodes, part trees or parts from the library window to the cost tree or part trees window. All associated information is copied with the selected cost nodes (associated cost and user functions, variables, part trees etcetera).

Modifying the Library

The library is modified using the *Library – Modify* menu option. Selecting this option closes the current project and displays the library in the standard cost tree and part tree windows. The library facility allows the user access to all the standard lccWare facilities, except that time sequences and time points can not be added to the library. A single fixed time sequence and set of time points are automatically provided for testing purposes.

When modifying a library any existing project can be opened and displayed in the library window, which is where the library is normally displayed when modifying projects. This feature allows the user to copy cost structures from existing projects to the library.

After modifying the library it is recommended that it is tested using the *Consistency Check* and *Run Analysis* dialogs.

Project Wizard

The project wizard simplifies the creation of new projects. The wizard is based on allowing the user to select cost nodes from the master library and creating the new project based on these cost nodes.

The wizard prompts the user for the following information:

Project options – date format, system description, compiled by and approved by.

Number of time sequences and names.

Start date, number of time interval, and the time interval (month or year).

Which cost nodes to copy from the library.

Cost Calculation

At each time point in each selected time sequence the cost of each node on the cost tree is calculated from the cost function that is assigned to that node.

Debugging the Analysis

Most users will not normally use the debug facility; this would be used in complex cost models to trace the progress of the calculation through the coding. The debug process is controlled using the options on the *Debug* menu or the equivalent toolbar button. The debug process is described with reference to the

Debug menu options but the description applies equally to the toolbar buttons.

The debug process is started by selecting the *Debug, Start Debugger* menu. The debugger will now be in break mode, with no statements having been executed. In this state breakpoints may be set in the code window using the *Debug, Toggle Breakpoint* menu option.

Execution is started by selecting the *Debug, Go* menu option. Execution continues until a breakpoint is reached or the *Debug, Pause* menu option is selected. A breakpoint may be set whilst the analysis is executing. The debugger is now in break mode and the following debug menu options may be used:

- *Toggle Breakpoint*
- *Step Into* a function, executing a single statement at a time
- *Step Over* a function, executing a single statement at a time
- *Step Out Of* a function, executing a single statement at a time
- *Quick Watch* a selected variable

Execution is continued by selecting the *Debug, Go* menu option. When the analysis is complete the debug process returns to its initial state.

The debug process may be terminated at any time by selecting the *Debug, End* menu option.

Importing and Exporting Data

LccWare provides extensive import and export facilities allowing users to transfer project data to and from Microsoft Access compatible databases, Microsoft Excel worksheets and text files.

The lccWare project file is based on a database structure in which each database is composed of tables. Each table is composed of

records and records are made up of fields. For instance the lccWare project database has tables such as the Cost Nodes table which holds information on the cost nodes in the project. The Constant Global Variables table contains records for each constant global variable and these records contain fields called Name, Description and Default Value. An Excel workbook is equivalent to the database and contains worksheets that correspond to tables. The worksheets are arranged in tabular form with rows corresponding to records that contain fields. A text file corresponds to a table. The file contains records that are composed of fields.

Both the import and export features are accessed from options on the lccWare *File* menu.

The user should choose the *File, Export* menu option to begin the process of specifying the data to export. The Export program will then appear.

The user should choose the *File, Import* menu option to begin the process of specifying the data to import. The Import program will then appear.

The Import and Export programs are generic facilities providing import and export facilities for other compatible applications. The detailed description for each program makes no explicit reference to lccWare, referring instead to the ‘application'.

Security

By default lccWare applies no security restrictions to the project databases it creates. Any user may create and access a lccWare project. In fact if no password has been set for the administrative user *admin* then the normal user will be unaware of the security mechanism.

To activate lccWare security the */secure* flag must be added to the lccWare command line. This will normally be done by appending */secure* to the *Target* property of the existing lccWare shortcut in the lccWare program group, or by creating a new shortcut with the */secure* flag set.

When the security mechanism is activated all project databases have security information appended. This information determines what operations individual users can perform on the lccWare project. When starting lccWare in secure mode the user is presented with a logon dialog requesting the user name and password. A lccWare user may belong to one of four security groups, viz:

- Admins — This group may create and delete users, change passwords, create lccWare projects and run analyses. There is only one user belonging to this group, the *Admin* user.
- Design lccWare — This group may create lccWare projects and run analyses.
- Modify lccWare Data — This group may modify lccWare project data (but not add cost nodes or functions) and run analyses.
- Read lccWare Data — This group may read lccWare project data and run analyses.

The permissions assigned to each of these groups are described in more detail in Appendix V.

On installation the security system has four users, *admin* (belonging to the *Admins* group), *design* (belonging to the *Design lccWare* group), *modify* (belonging to the *Modify lccWare Data* group), and *read* (belonging to the *Read lccWare Data* group). The passwords are not set for these users.

It should be noted that if the password is set for the *admin* user then even if the */secure* command line flag is not set then the lccWare user will be prompted for a user name and password. In this case lccWare will restrict access to secured projects according to the group membership of the user (in exactly the same manner as if the */secure* flag was set).

The lccWare security system is based on the same system as Microsoft Access. Thus users can not modify or view the database in Microsoft Access (or other products based on the Jet database

engine) without the correct permissions.

The IccWare security file (*system.mdw*) is installed in the same directory as the program executable. It is important that this file is protected from being deleted or overwritten by unauthorised users. This is normally achieved by using the operating system file permissions.

Menu Commands

These menus contain options to control the use of IccWare. Some of the more commonly used options are also available through the toolbar buttons; the tool tips on the buttons identify their purpose. Each menu option is described below:

File Menu

New Project	Displays the *New Project* dialog. This allows the user to create a blank project, create a project using the Project Wizard, open an existing project or open a recent project.
Open Project	Opens an existing project. If in modify library mode opens the project in the library window.
Save Project	Save the current project in its original project file
Save Project As	Save the current project in a new project file
Close	Close the current project
Print Preview	Print Previews text or graph reports
Print	Prints text or graph reports
New Report	Design text or graph reports
Import	Import data from Access, Excel or text file formats
Export	Export data to Access, Excel or text file formats
Recent Projects	Provides a list of recently used projects for re-opening
Exit	Closes down IccWare

Edit Menu

Undo	Undo previous actions
Redo	Redo previous actions
Cut	Cut selected objects and place in clipboard
Copy	Copy selected objects and place in clipboard
Paste	Copy objects from clipboard
Delete	Delete selected objects
Add Cost Node	Add a cost node to the cost tree
Find Cost Node	Find and display a cost node on the cost tree
Move Cost Node	Move a selected cost node up or down the cost tree
Add Part Tree	Add a part tree to the part trees.
Add Part	Add a part to a part tree.
Move Part Tree/Part	Move a selected part tree or part up or down the part trees.
Time Sequences	Create or edit the set of time sequence names
Time Points	Create or edit the set of time points in a time sequence
Global Variables	Create global variable names / assign values to global variables
Cost Functions	Create or edit cost functions
Global Functions	Create or edit global functions
User Functions	Create or edit user functions
Part Tree Variables	Create constant and time dependent part tree variables

Options	Set options that apply for this project or globally for all projects

View Menu

Options	Set options that determine what will be displayed on the cost tree

Tools Menu

Consistency Check	Dialog that reports on checks made on the cost model
Browse	Dialog that provides information on the model entities
Secure Project	Adds security information to the current project database. Only available to members of the *Admins* and *Design IccWare* security group.
User Administration	Dialog that allows users to be created and deleted, and user passwords to be reset to new values. Only available to members of the *Admins* security group.
Change Password	Dialog that allows the current user to change their password.

Library Menu

Modify	Closes the current project and opens the library for editing.

Analysis Menu

Run	Dialog that enables you to run the cost calculation
Sensitivity Study	Dialog that allows the user to specify percentage variations in, or offsets to,

	global and local variable values. The analysis is run once for each variation, allowing the user to study the sensitivity of the analysis to individual variables.

Window Menu

Tile Horizontally	Tiles the cost tree and report generator windows horizontally.
Tile Vertically	Tiles the cost tree and report generator windows vertically.
Cascade	Rearranges the cost tree and report generator windows so that they overlap in a cascade.
Arrange Icons	Arranges the icons of minimised windows neatly at the bottom left of the window.
Window List	Lists all open cost tree and report generator windows.

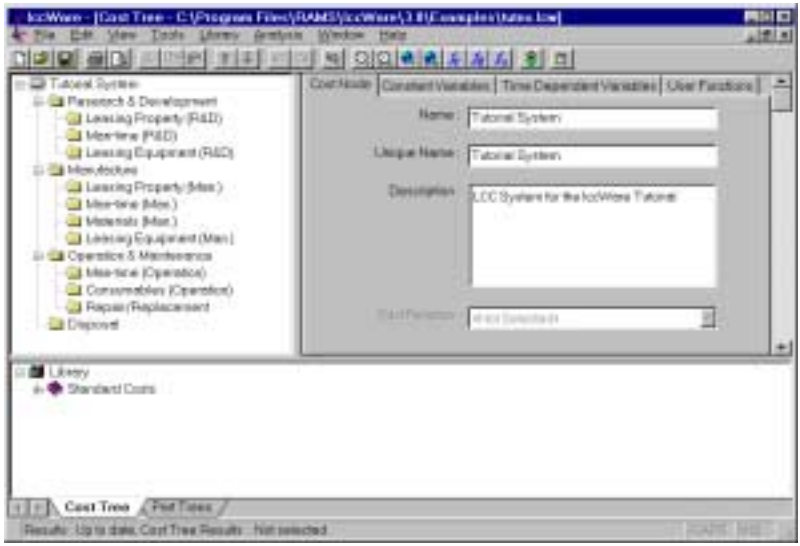
Help Menu

Help Topics	Displays the table of contents for the lccWare help file.
Help On Selection	Displays the help topic for the current selection in the cost tree window.
About lccWare	Displays the *About* dialog for lccWare.

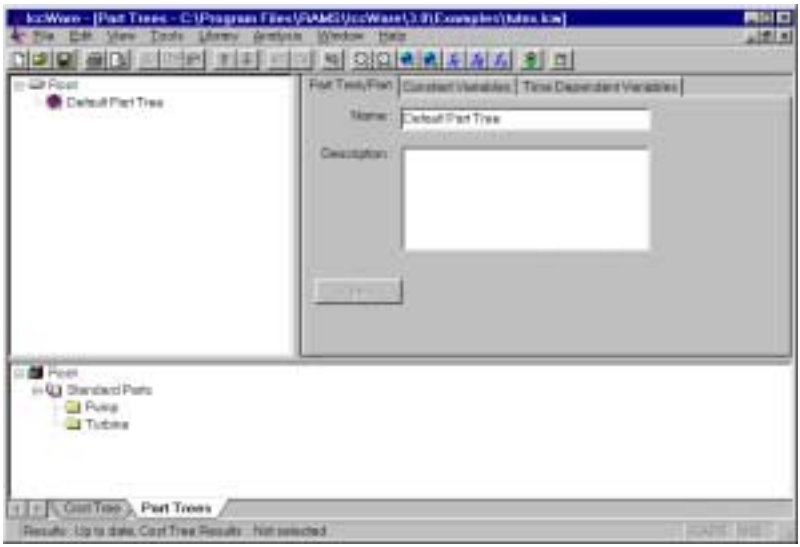
The IccWare Main Window

The main window can either display the cost tree window or the part trees window. The required window is selected using the tab control at the bottom of the main window.

The cost tree window is divided by two adjustable splitter bars into three further windows. The cost tree structure is displayed in the top left window. The attributes of the currently selected cost node are displayed in the top right window. The library cost structure is displayed in the bottom window, although this window may be hidden if required.



The part trees window is divided by two adjustable splitter bars into three further windows. The part trees structure is displayed in the top left window. The attributes of the currently selected part tree or part are displayed in the top right window. The library part trees structure is displayed in the bottom window, although this window may be hidden if required.



Cost Tree Window

Cost Tree Structure

In order to create a cost tree you must first open a new project by choosing the *File, New Project…* menu option or equivalent toolbar button if you are not already in a new project. This menu option will display the *New Project* dialog. This allows the user to create a blank project, create a project using the Project Wizard, open an existing project or open a recent project.

There are three methods of creating cost nodes. The first method uses the *Edit, Add Cost Node* facility, the second uses the C*ut, Copy* and *Paste* options and the third uses *drag* and *drop.* These alternatives are explained in the following paragraphs.

After opening a new project the root node will be selected and its name will be highlighted. Next choose the *Edit, Add Cost Node…* option, click on the *Add Cost Node* button on the toolbar or choose *Add Cost Node* from the right button pop-up menu. Then type a cost node unique name into the text box in the resulting *Name*

dialog (this is also assigned to the cost node name) and click on the *OK* button. The new node will then appear in the cost tree as a child of the root node. You can repeat the process for as many new nodes as you wish to create at this level in the tree structure, each cost node must have a unique name (the cost node name does not have to be unique). You can create child cost nodes below any existing cost node by first selecting the existing node and then follow the procedure to add a node as described above.

You can move or copy existing cost nodes and their children by first selecting the node and then copying it by choosing the *Cut* or *Copy* options on the *Edit* menu or the right button pop-up menu or the equivalent toolbar buttons. The *Cut* option will delete the selected node and its children after copying them to the clipboard. The copied nodes can then be added to the tree by first selecting the node at which they are to be added and then choosing the *Paste* option. Because each cost node must have a unique name the copied node will initially be given the unique name 'copy of xyz', where xyz is the unique name of the original node. You can change these names by selecting a node in the tree and then edit its unique name in the *Unique Name* field in the *Cost Node* tab.

You can also use the *drag and drop* facility to move or copy nodes. If the *Ctrl* key is pressed during the drop operation, the nodes will be copied; otherwise they will be moved. First select the node to be copied then place the cursor over the node and keeping the left mouse button pressed down, drag the cursor to the node where the node is to be copied whilst pressing the *Ctrl* key, then release the left button. The selected node and any children will be copied to the specified position in the tree. The nodes will be removed from their original position if the *Ctrl* key is not pressed.

You can use *copy, cut, paste* and *drag and drop* to copy cost nodes between lccWare projects. When you copy between projects all information associated with the selected cost node(s) is also copied: cost functions, the global and local variables associated with and referenced by the cost functions, the part trees referenced by the cost functions, the global functions referenced by the cost functions, and the user functions. All variables are created with their default values.

How to Delete a Cost Node

A selected cost node and any children can be deleted from the tree by choosing the *Edit, Delete* menu option or the *Delete* option on the right button pop-up menu.

How to Reorder the Cost Tree

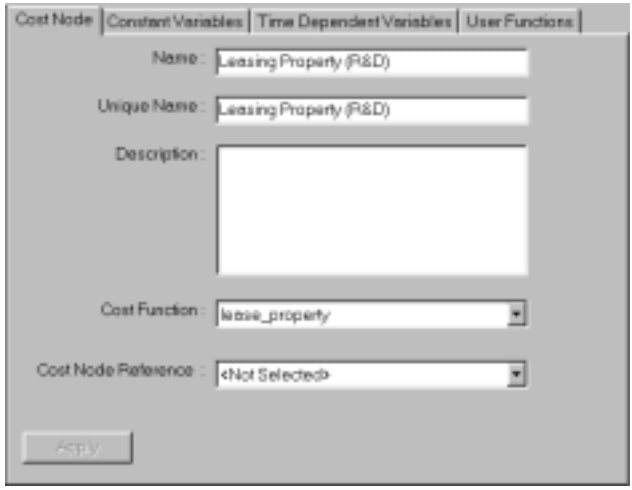
A selected node can be moved in the tree structure by choosing the *Edit, Move Cost Node, Up* or *Edit, Move Cost Node, Down* menu options. These options move the selected node, and any children, up or down by one position at a time on the same indenture level of the tree.

How to Find a Cost Node

It may be difficult to locate a particular tree node on a large tree so the *Edit, Find Cost Node* menu option has been included in lccWare. You should type the unique name of the required cost node into the *Name* dialog and then the tree will be moved, if necessary, so that the node will appear selected in the viewing area.

The *Cost Node* Tab

You should start by selecting the cost node, which you intend to modify. Make sure that the *Cost Node* tab is visible.



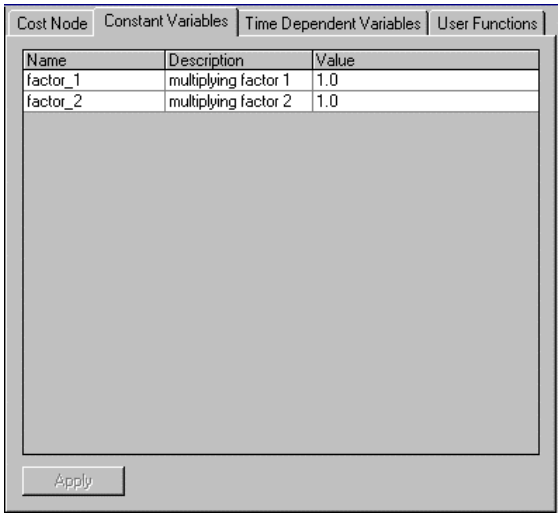
The cost node unique name must be unique in the whole cost tree. The same cost node name can be used one or more times.

You can add a description for the cost node in the *Description* field. The *Cost Function* drop-down menu allows you to assign a cost function to the cost node, you should select the required cost function name. The *Cost Node Reference* drop-down menu should be used to assign a cost node reference name if this cost node is the child of a cost node whose cost function uses cost node references.

Changes are saved on selecting the *Apply* button, a new cost node, or another tab.

The *Constant Variables* Tab

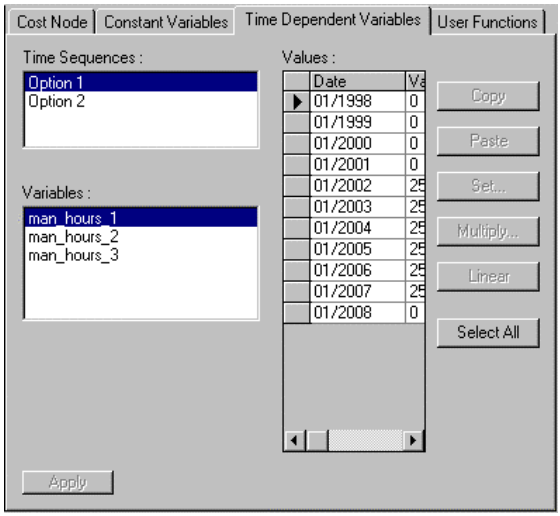
The *Constant Variables* tab shows a list of local constant variables that are associated with the cost function. At this stage you can modify the value of any of the variables.



Changes are saved on selecting the *Apply* button, a new cost node, or another tab.

The *Time Dependent Variables* Tab

The *Time Dependent Variables* tab shows a list of time dependent local variables that are associated with the cost function.



First select a time sequence name from the list of time sequences and the local variable name. The grid of time points and time values will then appear at the right side of the dialog.

Initially these are the default value that you supplied when creating the variables. There are several ways of modifying the values including direct overwriting and specifying linearly increasing values. A time point is selected by clicking on the button at the left of the time point.

A block of time points can be selected by selecting the first one as described above then selecting the second whilst pressing the *Shift* key. A range of time points can be selected by selecting the first one as described above then selecting the second whilst pressing the *Ctrl* key. The entire set of time points can be selected by clicking on the *Select All* button.

You can change individual values by clicking on the value and typing the new value. You can set a block of values by first selecting them and clicking on the *Set* button. You can then type the new value into the resulting dialog field.

You can multiply a block of values by a specified value by first selecting them and clicking on the *Multiply* button. You can then type the multiplier into the resulting dialog field

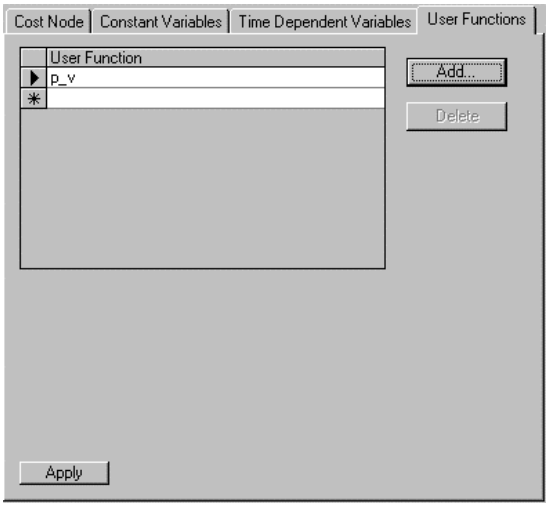
You can set the values to be a linear interpolation between the first and last values in a selected range by clicking on the *Linear* button.

You can select a single row or block of rows in the grid and then copy them to the IccWare clipboard by clicking the *Copy* button. You can then paste this row or block of rows into another grid by selecting the same start time point and then clicking on the *Paste* button.

Changes are saved on selecting the *Apply* button, a new cost node, or another tab.

The *User Functions* Tab

You can assign user functions to the cost node by clicking on the *Add* button and selecting a user function from the list in the *Select User Function* dialog.



Changes are saved on selecting the *Apply* button, a new cost node, or another tab.

Part Trees Window

Part Trees Structure

The part trees structure is created with a single part tree called *Default Part Tree* when a new project is created. The parent node of this part tree is called the root. Part trees can only be created directly below the root : parts are created as children of a part tree and parts can have as many child parts as required. The part tree variables associated with a part tree are created using the *Part Tree Variables* dialog. The values for these variables are entered in the attributes window when a part is selected.

There are three methods of creating part trees and parts. The first method uses the *Edit - Add Part Tree* or *Edit – Add Part* menu option, the second uses the C*ut* (parts only)*, Copy* and *Paste* options and the third uses *drag* and *drop.* These alternatives are explained in the following paragraphs.

To create a part tree select the part trees root. Next choose the *Edit, Add Part Tree…* option or choose *Add Part Tree* from the right button pop-up menu. Then type the part tree name into the text box in the resulting *Name* dialog and click on the *OK* button. The new part tree will then appear as a child of the root. You can repeat the process for as many new part trees as you wish to create. Each part tree must have a unique name.

To create a part below any existing part tree or part first select an existing part tree or part and then choose the *Edit, Add Part…* option or choose *Add Part* from the right button pop-up menu. Then type the part name into the text box in the resulting *Name* dialog and click on the *OK* button. The new part will then appear as a child of the selected part tree or part. You can repeat the process for as many new parts as you wish to create. All the parts associated with an individual part tree must have a unique name.

You can move or copy existing part trees or parts and their children by first selecting the part tree or part and then copying it

by choosing the *Cut* (parts only) or *Copy* options on the *Edit* menu or the right button pop-up menu or the equivalent toolbar buttons. The *Cut* option will delete the selected part and its children after copying them to the clipboard. The copied part trees or parts can then be added to the tree by first selecting the part tree or part at which they are to be added and then choosing the *Paste* option. Because each part tree or part under a part tree must have a unique name any copied non-unique items will be given the name 'copy of xyz', where xyz is the name of the original item. You can change these names by selecting a part tree or part and then edit its name in the *Name* field in the *Part Tree/Part* tab.

You can also use the *drag and drop* facility to move or copy part trees or parts. If the *Ctrl* key is pressed during the drop operation, the nodes will be copied; otherwise they will be moved. First select the part tree or part to be copied then place the cursor over the selection and keeping the left mouse button pressed down, drag the cursor to the part tree or part where the selection is to be copied whilst pressing the *Ctrl* key, then release the left button. The selected part tree or part, and any children, will be copied to the specified target position. If the selection is a part then the selected parts and any children will be removed from their original position if the *Ctrl* key is not pressed.

You can use *copy, cut, paste* and *drag and drop* to copy part trees and parts between lccWare projects.

How to Delete a Part Tree or Part

A selected part tree or part and any children can be deleted by choosing the *Edit, Delete* menu option or the *Delete* option on the right button pop-up menu.

How to Reorder the Part Trees or Parts

A selected part tree or part can be moved in the tree structure by choosing the *Edit, Move Part Tree/Part, Up* or *Edit Move Part Tree/Part, Down* menu options. These options move the selected part tree or part, and any children, up or down by one position at a time on the same indenture level of the tree.

The Part Tree/Part Tab

You should start by selecting the part tree or part which you intend to modify. Make sure that the *Part Tree/Part* tab is visible.

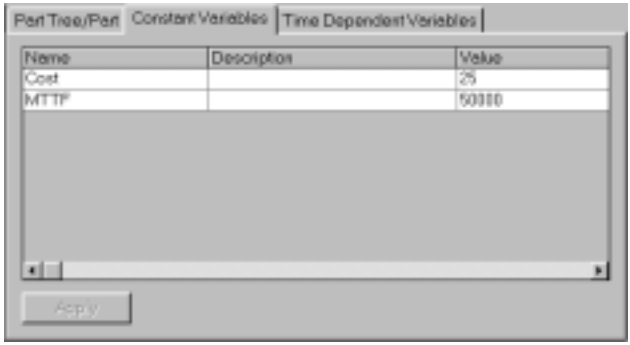
Enter a new name for the part tree or part in the *Name* field. A part tree name must be unique. A part name must be unique for the part tree to which it belongs.

You can add a description for the part tree or part in the *Description* field.

Changes are saved on selecting the *Apply* button, a new part tree or part, or another tab.

Constant Variable Values

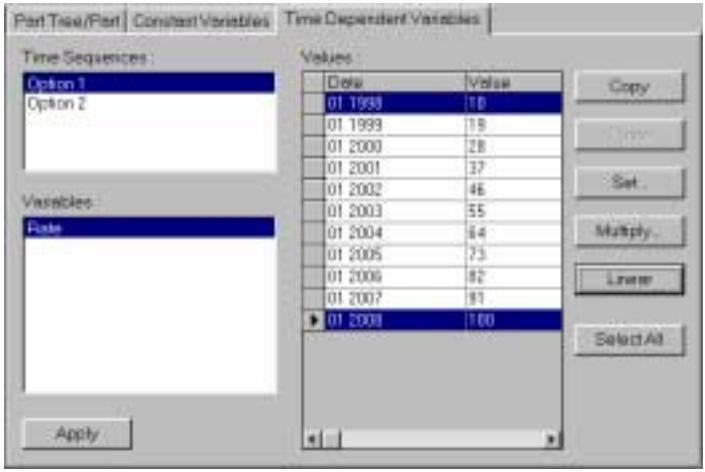
The *Constant Variables* tab shows a list of constant part tree variables that are associated with the part tree that the part belongs to. At this stage you can modify the value of any of the variables.



Changes are saved on selecting the *Apply* button, a new part tree or part, or another tab.

Time Dependent Variable Values

The *Time Dependent Variables* tab shows a list of time dependent part tree variables that are associated with the part tree that the part belongs to. At this stage you can modify the value of any of the variables.



First select a time sequence name from the list of time sequences and the local variable name. The grid of time points and time values will then appear at the right side of the dialog.

Initially these are the default value that you supplied when creating the variables. There are several ways of modifying the values including direct overwriting and specifying linearly increasing values. A time point is selected by clicking on the button at the left of the time point.

A block of time points can be selected by selecting the first one as described above then selecting the second whilst pressing the *Shift* key. A range of time points can be selected by selecting the first one as described above then selecting the second whilst pressing the *Ctrl* key. The entire set of time points can be selected by clicking on the *Select All* button.

You can change individual values by clicking on the value and typing the new value. You can set a block of values by first selecting them and clicking on the *Set* button. You can then type the new value into the resulting dialog field.

You can multiply a block of values by a specified value by first selecting them and clicking on the *Multiply* button. You can then type the multiplier into the resulting dialog field

You can set the values to be a linear interpolation between the first and last values in a selected range by clicking on the *Linear* button.

You can select a single row or block of rows in the grid and then copy them to the IccWare clipboard by clicking the *Copy* button. You can then paste this row or block of rows into another grid by selecting the same start time point and then clicking on the *Paste* button.

Changes are saved on selecting the *Apply* button, a new part tree or part, or another tab.

Cost Tree Library Window

Cost nodes in the library are organised into cost categories. This allows many cost node structures to be contained in the master library.

You can copy cost nodes and their children to the project cost tree structure by first selecting the cost node and then copying it by

choosing the *Copy* option on the *Edit* menu or the right button pop-up menu or the equivalent toolbar button. The copied nodes can then be added to the tree by first selecting the node at which they are to be added and then choosing the *Paste* option. Because each cost node must have a unique name the copied node will initially be given the unique name ‘copy of xyz’, where xyz is the unique name of the original node. You can change these names by selecting a node in the tree and then edit its unique name in the *Unique Name* field in the *Cost Node* tab.

You can also use the *drag and drop* facility to copy cost nodes. First select the cost node to be copied then place the cursor over the node and keeping the left mouse button pressed down, drag the cursor to the cost node where the node is to be copied, then release the left button. The selected node and any children will be copied to the specified position in the tree.

Part Trees Library Window

Many part tree structures can be contained in the master library.

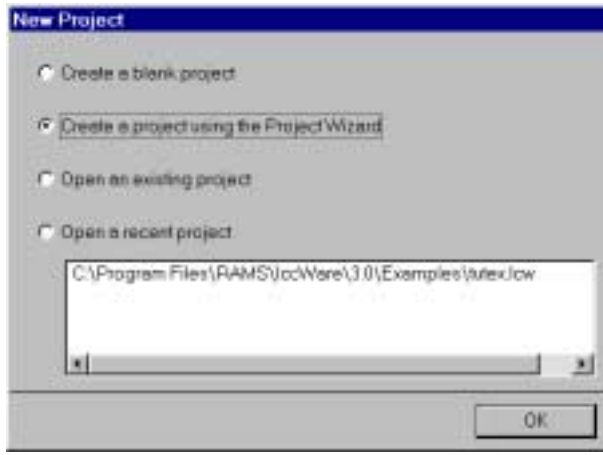
You can copy existing part trees or parts and their children by first selecting the part tree or part and then copying it by selecting the *Copy* option on the *Edit* menu or the right button pop-up menu or the equivalent toolbar button. The copied part trees or parts can then be added to the tree by first selecting the part tree or part at which they are to be added and then choosing the *Paste* option. Because each part tree or part under a part tree must have a unique name any copied non-unique items will be given the name ‘copy of xyz’, where xyz is the name of the original item. You can change these names by selecting a part tree or part and then edit its name in the *Name* field in the *Part Tree/Part* tab.

You can also use the *drag and drop* facility to copy part trees or parts. First select the part tree or part to be copied then place the cursor over the selection and keeping the left mouse button pressed down, drag the cursor to the part tree or part where the selection is to be copied then release the left button. The selected part tree or part, and any children, will be copied to the specified target position.

Dialog Descriptions

Each of the main dialogs in IccWare is described in this section.

The New Project Dialog

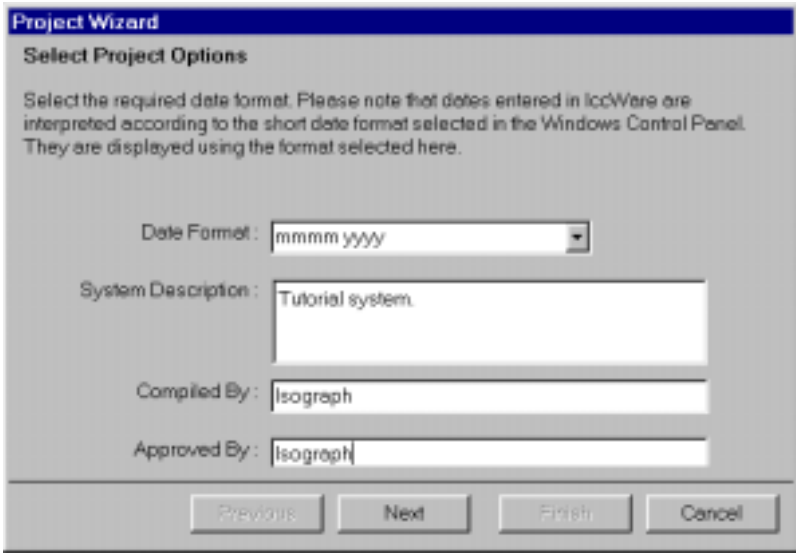


The *New Project* dialog provides options to create a blank project, create a project using the *Project Wizard*, open an existing project or open a recent project by selecting the appropriate option and then the *OK* button.

Selecting a file from the recent file list automatically selects the *Open a recent project option*. Double-clicking on a file in the recent file list automatically opens that file and closes the *New Project* dialog.

The Project Wizard Dialog

The Select Project Options Dialog

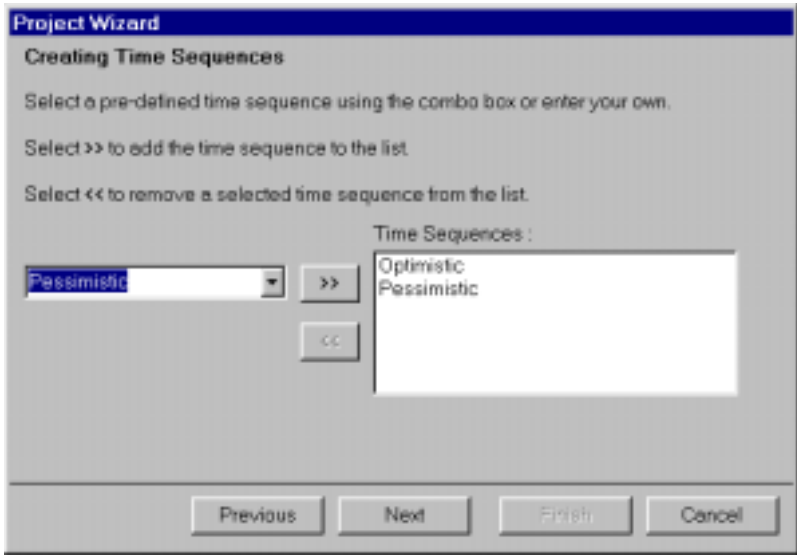

Project Wizard
Select Project Options
Select the required date format. Please note that dates entered in IccWare are interpreted according to the short date format selected in the Windows Control Panel. They are displayed using the format selected here.
Date Format :
mmmm yyyy
System Description :
Tutorial system.
Compiled By :
Isograph
Approved By :
Isograph
Previous
Next
Finish
Cancel

The *Select Project Options* allows the user to specify the following fields from the *Options* dialog. These are :

Date Format	You can choose the date format that will be used to display dates in the *Results Summary* section of the *Run Analysis* dialog by clicking on one of the options on the *Date Format* drop-down menu. Other date formats can be entered directly into the drop-down control. This
System Description	Enter the required text.
Compiled By	Enter the required text.
Approved By	Enter the required text.

Select the *Next* button to proceed to the *Creating Time Sequences* dialog.

The Creating Time Sequences Dialog



The *Creating Time Sequences* dialog allows the user to create a project with one or more of the two pre-defined time sequences *Pessimistic* or *Optimistic.* Alternatively the user may enter their own time sequence name.

To add pre-defined time sequence name select the required name from the combo box drop-down and then select the >> button to add it to the *Time Sequences* list.

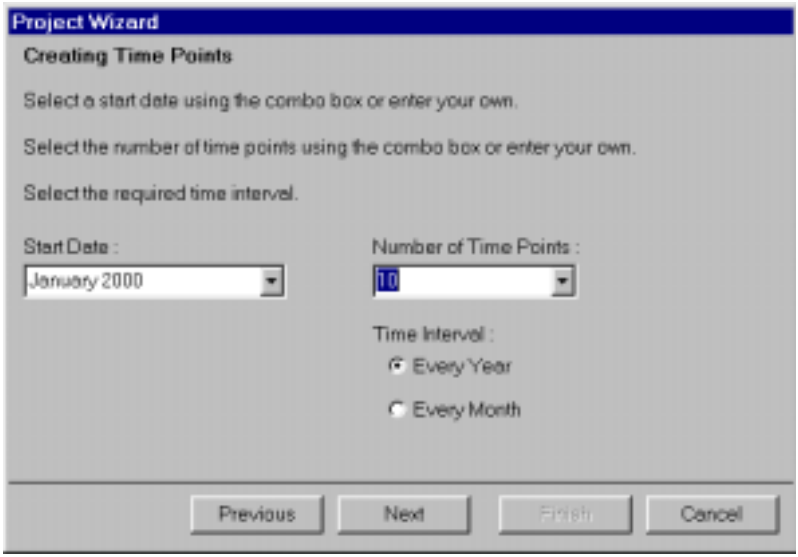
To add a user-defined name enter it in the combo box text area and then select the >> button to add it to the *Time Sequences* list.

To delete a time sequence name from the *Time Sequences* list select the required name in the list and then select the << button.

Select the *Next* button to proceed to the *Creating Time Points* dialog or the *Previous* button to return to the *Select Project Options*

dialog.

The Creating Time Points Dialog



The *Creating Time Points* dialog allows the user to add a number of time points to the time sequences created in the *Creating Time Sequences* dialog. The same number of time points are added to each of the time sequences, using the specified starting date.

To specify the starting date for the time points select the required date from the *Start Date* combo box drop-down or enter a user-defined value in the combo box text area.

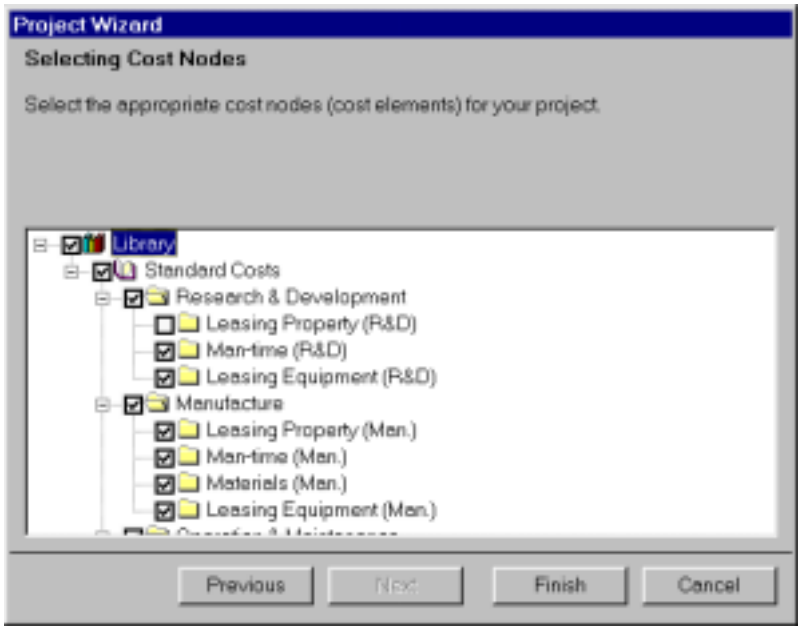
To specify the number of time points select the required number from the *Number of Time Points* combo box drop-down or enter a user-defined value in the combo box text area.

Select the interval between the generated time points using the *Time Interval* option.

Select the *Next* button to proceed to the *Selecting Cost Nodes*

dialog or the *Previous* button to return to the *Creating Time Sequences* dialog.

The Selecting Cost Nodes Dialog



The *Selecting Cost Nodes* dialog allows the user to select the cost nodes comprising the cost structure of the project.

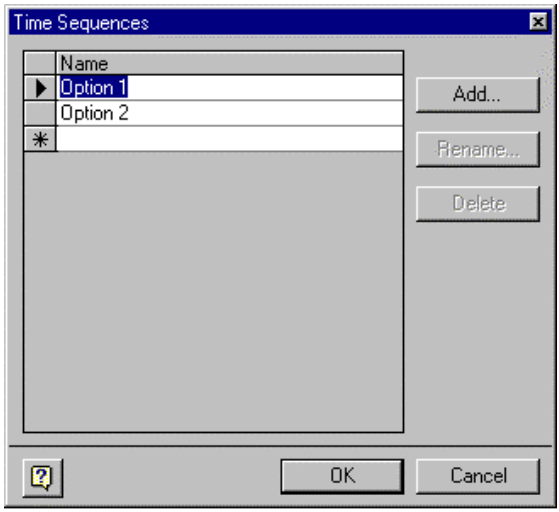
To select a cost node (and its children) select check box to the left of the cost node (or category). This will automatically select the cost node (or category), its children and all its parent cost nodes.

To de-select a selected cost node (or category) just select the check box. This will de-select the selected cost node and all its children.

Note that a cost node with a category as the parent is created in the project as a child of the root cost node.

Select the *Finish* button to create the project and dismiss the *Project Wizard* dialog, or the *Previous* button to return to the *Creating Time Points* dialog.

The Time Sequences Dialog



Adding Time Sequences

There are two methods for adding new time sequence names. Firstly you can add time sequences by clicking in the next available row in the grid and directly typing the name. Secondly you can click on the *Add* button and then type the name in the resulting dialog.

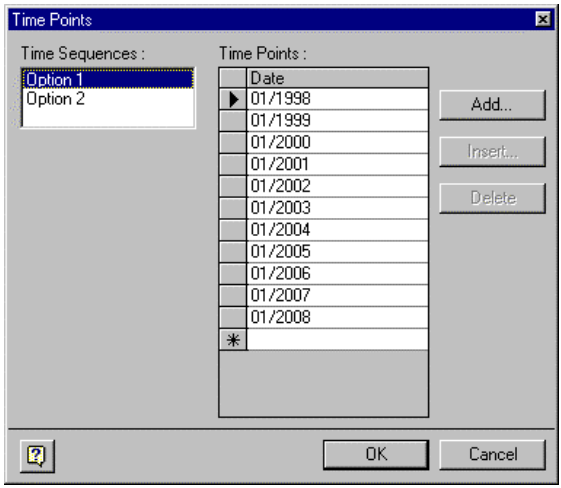
Renaming Time Sequences

There are two methods for renaming time sequence names. Firstly you can click on the name in the grid and then type directly over the name. Secondly you can select the row containing the name by clicking on the button at the left of the row and then click on the *Rename* button and type the name in the resulting dialog.

Deleting Time Sequences

You can delete time sequence names by selecting the row containing the name by clicking on the button at the left of the row and then click on the *Delete* button. You can delete a block of time sequences by selecting the first name in the block as described above and then selecting the last name in the block whilst pressing the *Shift* key. Clicking on the *Delete* button will then remove the block of names.

The Time Points Dialog



Adding Time Points

You must first select the time sequence to which you intend to add the time points in the *Time Sequences* list. This will activate the *Time Points* grid and the *Add* button. Initially the grid will contain only the default start date. You should next click on the *Add* button which will activate the *Add Time Points* dialog. You should type the number of time points that you wish to add into the text field and select the appropriate radio button to specify the interval between time points as either months or years. When you click on the *OK*

button the time points will appear in the grid. You can extend the number of time points by selecting the *Add* button again and repeating the process.

Inserting Time Points

You can insert time points into the time sequence by clicking on the button at the left of the existing time point at the point of insertion and then clicking on the *Insert* button. The resulting *Insert Time Points* dialog allows you to choose insertion before or after the insertion point and the interval between points. LccWare decides if there is space to insert the requested time points and if there is it will fill the interval. You cannot insert before the first time point or after the last time point in the sequence.

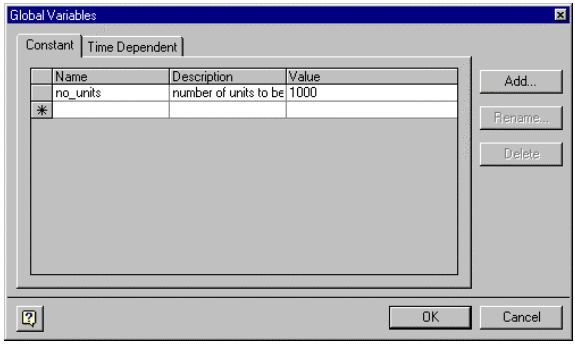
Modifying Time Points

You can modify a time point date by first clicking on it and then typing in the new date. Note that lccWare rounds all dates to the first day of the month. Dates that are entered in the short date format must correspond to the setting in the Control Panel Regional Settings Dialog. The date must be greater than the preceding date and less than the following date.

Deleting Time Points

Time points can be deleted individually or in blocks, the time points to be deleted must first be selected in the grid. A time point is selected by clicking on the button at the left of the time point. A block of time points can be selected by selecting the first one as described above then selecting the second whilst pressing the *Shift* key. You can delete the selected time point(s) by clicking on the *Delete* button.

The Global Variables Dialog



Adding Global Variables

You can add constant or time dependent global variables depending on whether you set the *Constant* or *Time Dependent* tab. There are two methods for adding new global variable names. Firstly you can add variables by clicking in the *Name* column in the next available row in the grid and directly typing the name. Secondly you can click on the *Add* button and then type the name in the resulting dialog. You can click in the *Description* field and type a description for the variable and click in the *Value* field to set a default value for the variable.

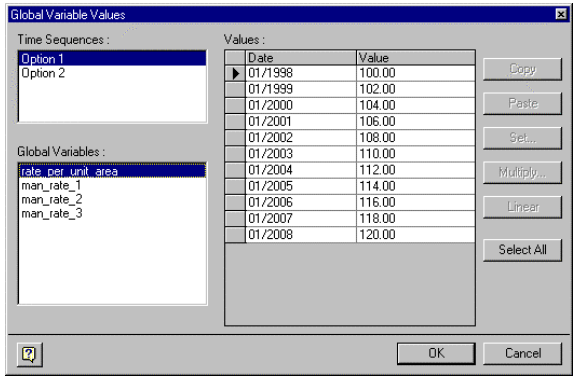
Renaming Global Variables

You can rename constant or time dependent global variables depending on whether you set the *Constant* or *Time Dependent* tab. There are two methods for renaming global variables. Firstly you can click on the name in the grid and then type directly over the name. Secondly you can select the row containing the name by clicking on the button at the left of the row and then click on the *Rename* button and type the name in the resulting dialog. Similarly, you can change the description or the default value.

Deleting Global Variables

You can delete constant or time dependent global variables depending on whether you set the *Constant* or *Time Dependent* tab. You can delete global variable names by selecting the row containing the name by clicking on the button at the left of the row and then clicking on the *Delete* button. You can delete a block of variables by selecting the first variable in the block as described above and then selecting the last variable in the block whilst pressing the *Shift* key. Clicking on the *Delete* button will then remove the block of names.

The Global Variable Values Dialog



Editing Global Variable Values

You must first select the combination of the time sequence in the *Time Sequences* list and the global variable in the *Global Variable* list. This will activate the *Time Points* grid. Initially the grid will contain the default values. A time point is selected by clicking on the button at the left of the time point.

A block of time points can be selected by selecting the first one as described above then selecting the second whilst pressing the *Shift* key. A range of time points can be selected by selecting the

first one as described above then selecting the second whilst pressing the *Ctrl* key. The entire set of time points can be selected by clicking on the *Select All* button.

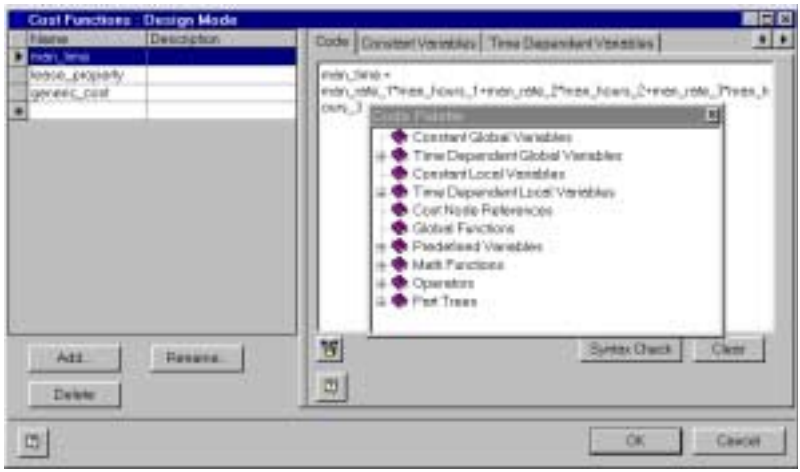
You can change individual values by clicking on the value and typing the new value. You can set a block of values by first selecting them and clicking on the *Set* button. You can then type the new value into the resulting dialog field.

You can multiply a block of values by a specified value by first selecting them and clicking on the *Multiply* button. You can then type the multiplier into the resulting dialog field

You can set the values to be a linear interpolation between the first and last values in a selected range by clicking on the *Linear* button.

You can select a single row or block of rows in the grid and then copy them to the IccWare clipboard by clicking the *Copy* button. You can then paste this row or block of rows into another grid by selecting the same start time point and then clicking on the *Paste* button.

The Cost Functions Dialog



Adding Cost Functions

Cost function names and their descriptions are displayed in the grid at the left side of the *Cost Function* dialog. There are two methods for adding new cost function names. Firstly you can add cost functions by clicking in the next available row in the grid and directly typing the name. Secondly you can click on the *Add* button and then type the name in the resulting dialog.

Renaming Cost Functions

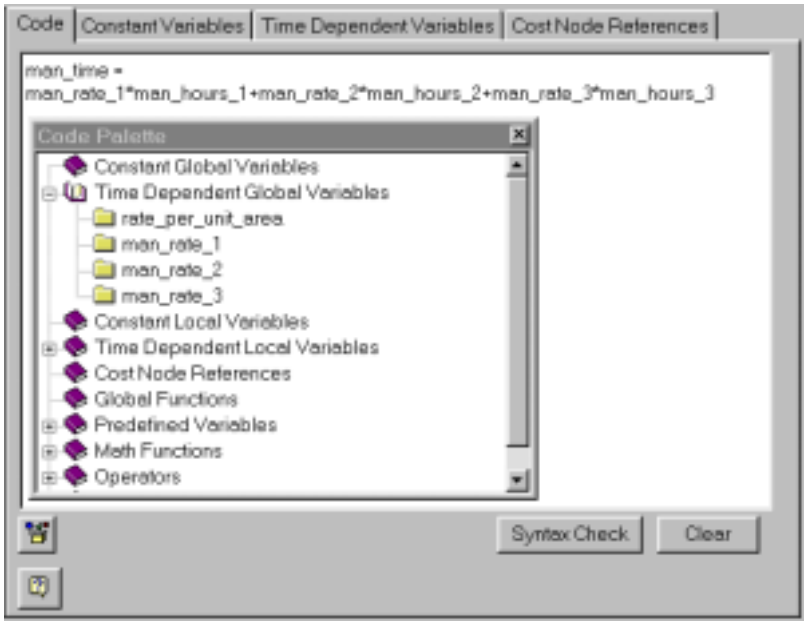
There are two methods for renaming cost functions. Firstly you can click on the name in the grid and then type directly over the name. Secondly you can select the row containing the name by clicking on the button at the left of the row and then click on the *Rename* button and type the name in the resulting dialog.

Deleting Cost Functions

You can delete cost function names by selecting the row containing the name by clicking on the button at the left of the row and then clicking on the *Delete* button. You can delete a block of cost functions by selecting the first name in the block as described above and then selecting the last name in the block whilst pressing the *Shift* key. Clicking on the *Delete* button will then remove the block of names.

Creating Cost Function Equations

You should click on the *Code* tab, select the cost function name and delete '<expression>' from the right side of the equation in the upper central text area.



You could replace this by typing the actual equation but you will probably find that using the 'drag and drop' features combined with the code palette pop-up window will be easier. The code palette is automatically displayed whenever the code tab is selected. If it is dismissed it can be re-displayed using the code palette button.

The code palette displays all the possible variables, functions, part tree variables and operators that can be included in the cost equation in a tree structure. Each category of object is represented by a top level node (or folder) in the tree. For example to copy a time dependent global variable first open the *Time Dependent Global Variables* folder. You will then see the list of time dependent global variables that you have created. In order to drag and drop one of the variables into the equation you should click on it with the left mouse button, keep the button depressed and then drag the variable into position in the equation. A cursor will appear when the variable is over the equation indicating the insert position. When you release the left mouse button the variable will be placed in the equation.

The PartTreeValue function is used to include part tree variable values in cost equations. . The PartTreeValue function parameters are as follows :

PartTreeValue (PartTree as String, Part as String,
PartTreeVariable as String, Type as String)

Valid values for Type are :

SUM	Function returns value of part and all it's children for the specified part tree variable.
PART	Function returns value of part for the specified part tree variable.

Example :

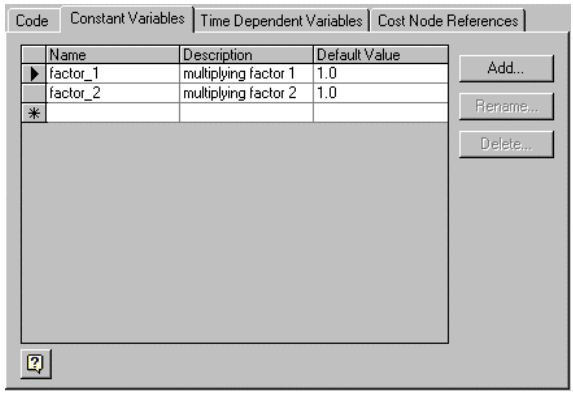
Man_time = PartTreeValue("Car", "Engine", "Cost", "SUM")

Using the code palette is the best method of generating a call to the PartTreeValue function in a cost equation. The part tree and parts hierarchy are represented by a series of folders in the code palette. Part tree variables are represented as nodes within part folders. To include a part tree variable value in a cost equation simply select a required variable node and drag and drop it into the cost equation. This will automatically create a call to the PartTreeValue function with the correct parameters

Finally, position the cursor at the end of the equation and press the *Return* key. You can try out the function by clicking on the *Syntax Check* button, any errors will be reported in a error window below the button. The error window is closed using the *Clear* button.

Adding Local Variables

You can add constant or time dependent local variables depending on whether you select the *Constant Variables* or *Time Dependent Variables* tab.



There are two methods for adding new local variable names. Firstly you can add variables by clicking in the *Name* column in the next available row in the grid and directly typing the name. Secondly you can click on the *Add* button and then type the name in the resulting dialog. You can click in the *Description* field and type a description for the variable and click in the *Value* field to set a default value for the variable.

Renaming Local Variables

You can rename constant or time dependent local variables depending on whether you select the *Constant Variables* or *Time Dependent Variables* tab. There are two methods for renaming local variables. Firstly you can click on the name in the grid and then type directly over the name. Secondly you can select the row containing the name by clicking on the button at the left of the row and then clicking on the *Rename* button and typing the name in the resulting dialog. Similarly, you can change the description or the default value.

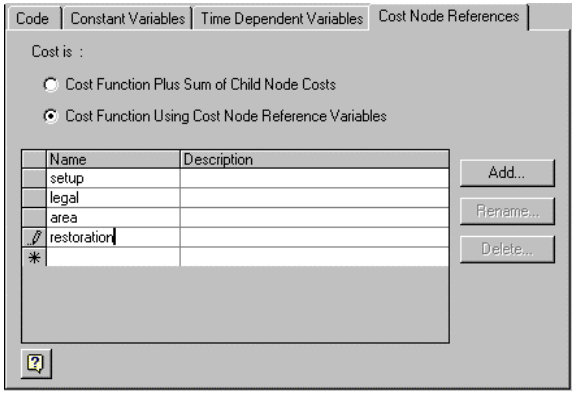
Deleting Local Variables

You can delete constant or time dependent local variables depending on whether you select the *Constant Variables* or *Time Dependent Variables* tab. You can delete local variable names by selecting the row containing the name by clicking on the button at the left of the row and then clicking on the *Delete* button. You can

delete a block of variables by selecting the first variable in the block as described above and then selecting the last variable in the block whilst pressing the *Shift* key. Clicking on the *Delete* button will then remove the block of names.

Adding Cost Node References

You should first click on the *Cost Node References* tab and then the *Cost Function using Cost Node Reference Variables* radio button.



There are two methods for adding new cost node reference names. Firstly you can add cost node references by clicking in the *Name* column in the next available row in the grid and directly typing the name. Secondly you can click on the *Add* button and then type the name in the resulting dialog. You can click in the *Description* field and type a description for the cost node reference.

Renaming Cost Node References

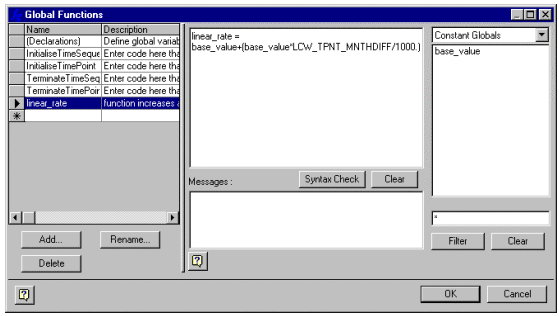
There are two methods for renaming cost node references. Firstly you can click on the name in the grid and then type directly over the name. Secondly you can select the row containing the name by

clicking on the button at the left of the row and then clicking on the *Rename* button and typing the name in the resulting dialog. Similarly, you can change the description or the default value.

Deleting Cost Node References

You can delete cost node references by selecting the row containing the name by clicking on the button at the left of the row and then clicking on the *Delete* button. You can delete a block of cost node references by selecting the first cost node reference in the block as described above and then selecting the last cost node reference in the block whilst pressing the *Shift* key. Clicking on the *Delete* button will then remove the block of names.

The Global Functions Dialog



Adding Global Functions

Global function names and their descriptions are displayed in the grid at the left side of the *Global Function* dialog. You will see some pre-named global functions supplied with lccWare. There are two methods for adding new global function names. Firstly you can add global functions by clicking in the next available row in the grid and directly typing the name. Secondly you can click on the *Add* button and then type the name in the resulting dialog.

Renaming Global Functions

There are two methods for renaming global functions. Firstly you can click on the name in the grid and then type directly over the name. Secondly you can select the row containing the name by clicking on the button at the left of the row and then clicking on the *Rename* button and typing the name in the resulting dialog.

Deleting Global Functions

You can delete global function names by selecting the row containing the name by clicking on the button at the left of the row and then clicking on the *Delete* button. You can delete a block of global functions by selecting the first name in the block as described above and then selecting the last name in the block whilst pressing the *Shift* key. Clicking on the *Delete* button will then remove the block of names.

Creating Global Function Equations

You should select the global function name and then delete '<expression>' from the right side of the equation in the upper central text area.

You could replace this by typing the actual equation but you will probably find that using the 'drag and drop' features combined with the code palette pop-up window will be easier. The code palette is automatically displayed whenever the code tab is selected. If it is dismissed it can be re-displayed using the code palette button.

The code palette displays all the possible variables, functions, part tree variables and operators that can be included in the cost equation in a tree structure. Each category of object is represented by a top level node (or folder) in the tree. For example to copy a time dependent global variable first open the *Time Dependent Global Variables* folder. You will then see the list of time dependent global variables that you have created. In order to drag and drop one of the variables into the equation you should click on it with the left mouse button, keep the button depressed and then drag the variable into position in the equation. A cursor will appear when the variable is over the equation indicating the insert position. When

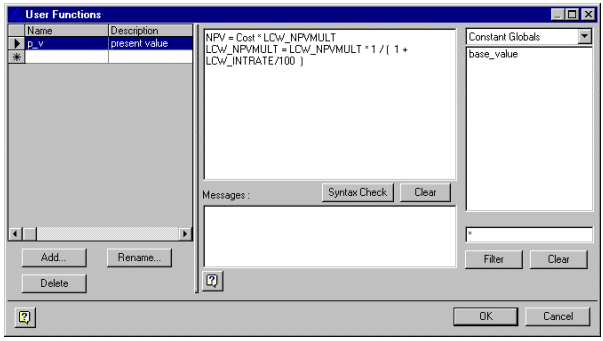
you release the left mouse button the variable will be placed in the equation.

Using the code palette is the best method of including part tree variable values in a cost equation. The part tree and parts hierarchy are represented by a series of folders in the code palette. Part tree variables are represented as nodes within part folders. To include a part tree variable value in a cost equation simply select a required variable node and drag and drop it into the cost equation. This will automatically create a call to the PartTreeValue function with the correct parameters. For example :

```
Man_time  = PartTreeValue("Car", "Engine", "Cost", "SUM")
```

Finally, position the cursor at the end of the equation and press the *Return* key. You can try out the function by clicking on the *Syntax Check* button, any errors will be reported in a error window below the button. The error window is closed using the *Clear* button.

The User Functions Dialog



Adding User Functions

User function names and their descriptions are displayed in the grid at the left side of the *User Function* dialog. There are two methods for adding new user function names. Firstly you can add user functions by clicking in the next available row in the grid and

directly typing the name. Secondly you can click on the *Add* button and then type the name in the resulting dialog.

Renaming User Functions

There are two methods for renaming user functions. Firstly you can click on the name in the grid and then type directly over the name. Secondly you can select the row containing the name by clicking on the button at the left of the row and then clicking on the *Rename* button and typing the name in the resulting dialog.

Deleting User Functions

You can delete user function names by selecting the row containing the name by clicking on the button at the left of the row and then clicking on the *Delete* button. You can delete a block of user functions by selecting the first name in the block as described above and then selecting the last name in the block whilst pressing the *Shift* key. Clicking on the *Delete* button will then remove the block of names.

Creating User Function Equations

You should select the user function name and then delete '<expression>' from the right side of the equation in the upper central text area.

You could replace this by typing the actual equation but you will probably find that using the 'drag and drop' features combined with the code palette pop-up window will be easier. The code palette is automatically displayed whenever the code tab is selected. If it is dismissed it can be re-displayed using the code palette button.

The code palette displays all the possible variables, functions, part tree variables and operators that can be included in the cost equation in a tree structure. Each category of object is represented by a top level node (or folder) in the tree. For example to copy a time dependent global variable first open the *Time Dependent Global Variables* folder. You will then see the list of time dependent global variables that you have created. In order to drag and drop one of the variables into the equation you should click on it with the left mouse button, keep the button depressed and then drag the

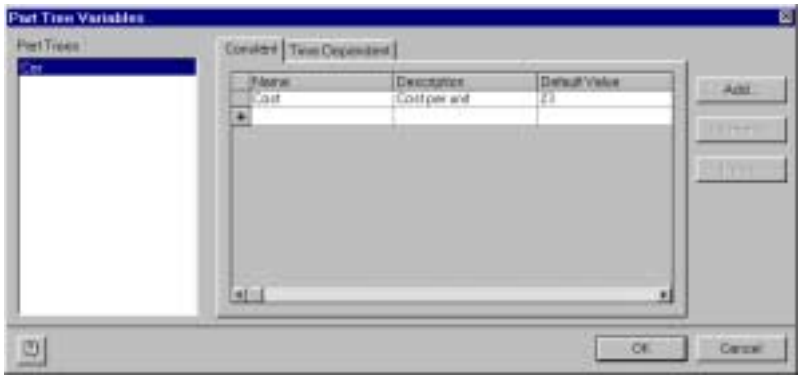
variable into position in the equation. A cursor will appear when the variable is over the equation indicating the insert position. When you release the left mouse button the variable will be placed in the equation.

Using the code palette is the best method of including part tree variable values in a cost equation. The part tree and parts hierarchy are represented by a series of folders in the code palette. Part tree variables are represented as nodes within part folders. To include a part tree variable value in a cost equation simply select a required variable node and drag and drop it into the cost equation. This will automatically create a call to the PartTreeValue function with the correct parameters. For example :

```
Man_time  = PartTreeValue("Car", "Engine", "Cost", "SUM")
```

Finally, position the cursor at the end of the equation and press the *Return* key. You can try out the function by clicking on the *Syntax Check* button, any errors will be reported in a error window below the button. The error window is closed using the *Clear* button.

The Part Tree Variables Dialog



Adding Part Tree Variables

Firstly select the part tree from the *Part Trees* list to which you wish to add variables.

You can add constant or time dependent part tree variables depending on whether you select the *Constant* or *Time Dependent* tab. There are two methods for adding new part tree variable names. Firstly you can add variables by clicking in the *Name* column in the next available row in the grid and directly typing the name. Secondly you can click on the *Add* button and then type the name in the resulting dialog. You can click in the *Description* field and type a description for the variable and click in the *Value* field to set a default value for the variable.

Renaming Part Tree Variables

Firstly select the part tree from the *Part Trees* list in which you wish to rename variables.

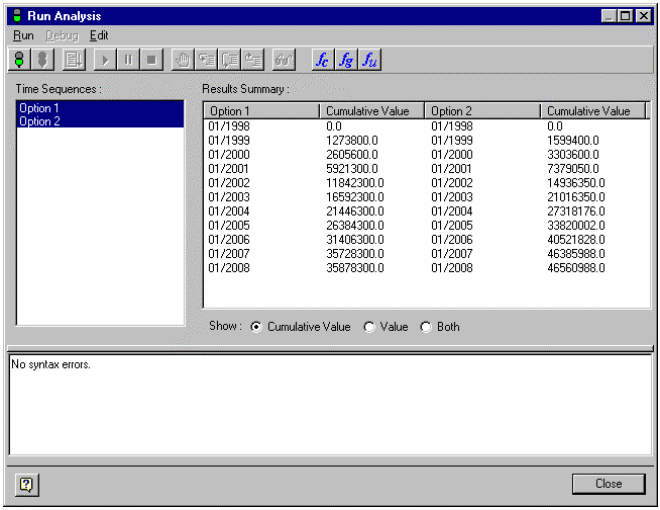
You can rename constant or time dependent part tree variables depending on whether you select the *Constant* or *Time Dependent* tab. There are two methods for renaming part tree variables. Firstly you can click on the name in the grid and then type directly over the name. Secondly you can select the row containing the name by clicking on the button at the left of the row and then click on the *Rename* button and type the name in the resulting dialog. Similarly, you can change the description or the default value.

Deleting Part Tree Variables

Firstly select the part tree from the *Part Trees* list from which you wish to delete variables.

You can delete constant or time dependent part tree variables depending on whether you select the *Constant* or *Time Dependent* tab. You can delete part tree variable names by selecting the row containing the name by clicking on the button at the left of the row and then clicking on the *Delete* button. You can delete a block of variables by selecting the first variable in the block as described above and then selecting the last variable in the block whilst pressing the *Shift* key. Clicking on the *Delete* button will then remove the block of names.

The Run Analysis Dialog



Selecting Time Sequences for the Analysis

There are three methods for selecting time sequences that will be used to calculate costs. Firstly you can select a single sequence by clicking on its name. Secondly, if you want to select more than one sequence you can click on the required names whilst pressing the *Ctrl* key. Thirdly, if you want to select a set of adjacent names you can click on the first and last names in the set names whilst pressing the *Shift* key.

Running the Analysis

When you have selected the time sequences that you wish to include in the analysis, you can start the calculation by selecting the *Run, Start Analysis* menu option or by clicking on the *Start Analysis* toolbar button. The cost results will appear in the upper right text area for each selected time sequence at each time point in the time sequence. The cost values, cumulative cost values or both can be displayed depending on which radio button you have

set. Any errors in the model will be reported in the text area in the lower part of the window.

Running in Debug Mode

Most users will not normally use the debug facility, this would be used in complex cost models to trace the progress of the calculation through the coding. When you have selected a single time sequence, you can run the calculation in 'debug' mode by selecting the *Debug, Start Debugger* menu option or by clicking on the *Start Debugger* toolbar button. The debug process is controlled using the *Debug* menu options or the equivalent buttons on the toolbar. The cumulative cost results will appear in the upper right text area for each selected time sequence at each time point in the time sequence as they are calculated during the debug run.

Editing Global, Cost or User Functions

You can easily investigate problems in the cost, global or user functions directly from this dialog by choosing the respective options on the *Edit* menu or the equivalent toolbar buttons.

Debug Commands

Go

Starts execution or continues execution when in break mode.

Pause

Stops execution of a program while it's running and switches to break mode. Any statement being executed when you choose this command is displayed in the Code window.

End

Ends execution and terminates the debug process.

Toggle Breakpoint

Sets or removes a breakpoint at the current line.

Step Into

Executes code one statement at a time. If the statement is a call to a procedure, the next statement displayed is the first statement in the procedure. Available in break mode only.

Step Over

Executes code one statement at a time. If the statement is a call to a procedure, then the procedure is executed as a unit. The next statement displayed is the next statement in the current procedure regardless of whether the current statement is a call to another procedure. Available in break mode only.

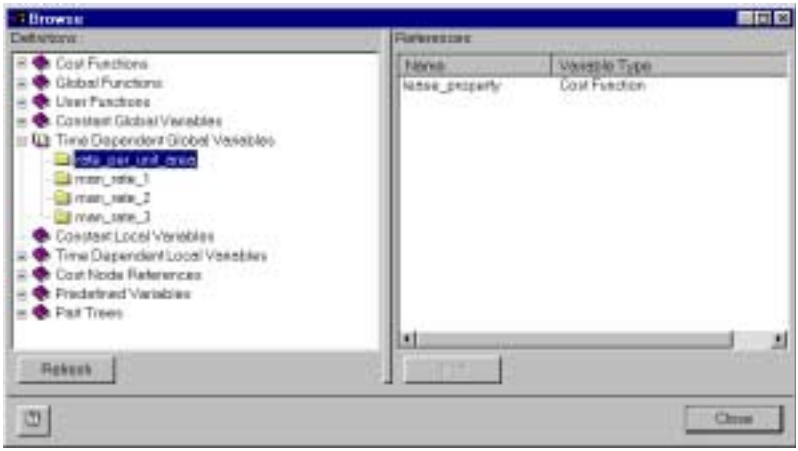
Step Out

Executes the remaining lines of a function in which the current execution point lies. The next statement displayed is the statement following the procedure call. All of the code is executed between the current and the final execution points. Available in break mode only.

Quick Watch

Displays the current value of the selected expression in the Immediate tab of the code window. Available only in break mode. Select the expression from the Code window, and then choose the Quick Watch command.

The Browse Dialog



The *Browse* dialog allows the user to examine references to all the variables, functions, part trees, parts and associated part tree variables. The user can select a reference and in the case of a function edit it, or in the case of a cost node display it.

Definitions Tree

Variable, function, part trees, parts and associated part tree variables are displayed in the *Definitions* tree at the left side of the window. The following types are displayed:

Cost Functions

Global Functions

User Functions

Constant Global Variables

Time Dependent Global Variables

Constant Local Variables

Cost Functions

Variables

Time Dependent Local Variables

Cost Functions

Variables

Cost Node References

Predefined Variables

Part Trees

Parts

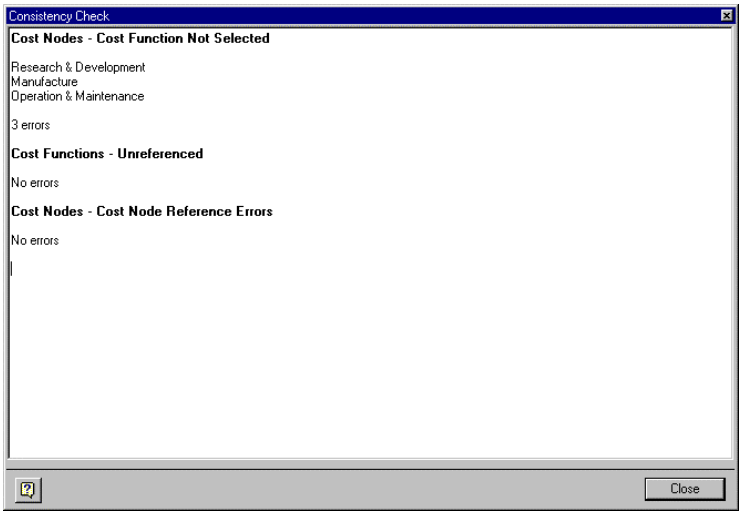
Part Tree Variables

References List

When you select one of the rows in the *Definitions* grid by clicking on the button at the left of the row any references to the variable or function will be displayed in the *References* list.

If the reference is selected in the list then it may be edited. In the case of a function the appropriate edit dialog is displayed, or in the case of a cost node the node is brought into view in cost tree structure.

The Consistency Check Dialog

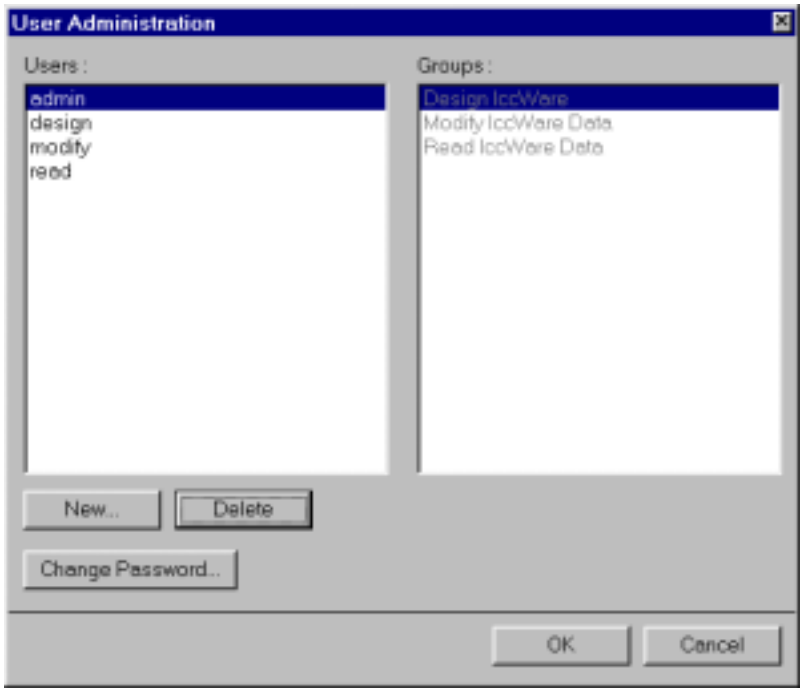


Consistency Checks

Messages relating to the following items are listed:

- Cost Nodes without Cost Functions
- Cost Functions not referenced on the cost tree
- Cost Node Reference errors

The User Administration Dialog



Adding a New User

Select the *New* button and then type the name in the resulting dialog.

Deleting Users

Select the required user name from the *Users* list and then select *Delete.* The *admin* user can not be deleted.

Changing a User Password

Select the required user name from the *Users* list and then select *Change Password*. In the resulting dialog enter the new password in the *New Password* field and confirm it in the *Verify New*

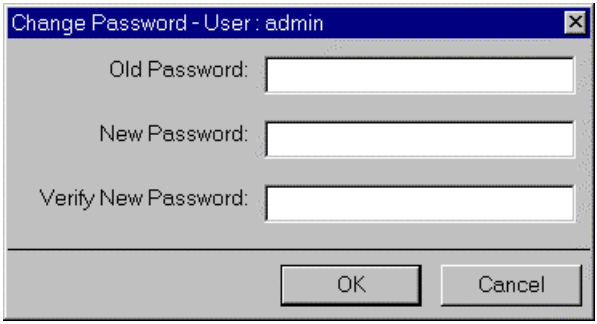
Password field. It is not necessary to enter the existing password, except when modifying the *admin* user password.

Select the *OK* button to accept the new password.

Selecting the User Security Group

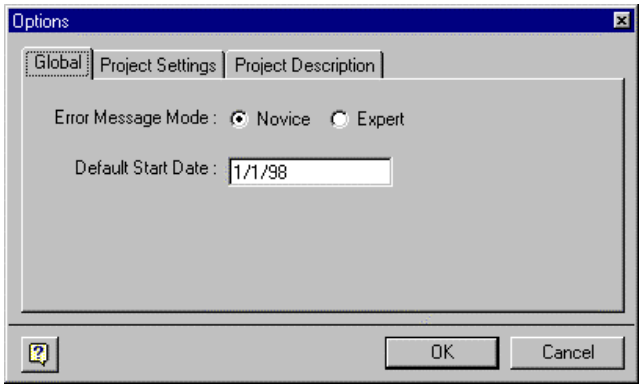
Select the required user name from the *Users* list and then select required security group from the *Groups* list. New users are assigned to the *Read IccWare Data* group when created.

The Change Password Dialog



Enter the current password in the *Old Password* field. Enter the new password in the *New Password* field and confirm it in the *Verify New Password* field. Select the *OK* button to set the new password.

The Options Dialog



This dialog contains two tabbed dialogs, *Global* and *Project*. Settings in the *Global* tab apply to all IccWare projects whilst those on the *Project* tab apply only to the current project.

The *Global* Tab

Error Message Mode

You should set the *Error Message Mode radio* buttons to be in either novice or expert mode. In Expert mode visual message prompts are replaced by message beeps except for critical errors.

Default Start Date

You can set the default start date for time sequences by typing in the *Default Start Date* field. Note that IccWare rounds all dates to the first day of the month. Dates that are entered in the short date format must correspond to the setting in the Control Panel Regional Settings Dialog.

The *Project Settings* Tab

Date Format

You can choose the date format that will be used to display dates in the *Results Summary* section of the *Run Analysis* dialog by

clicking on one of the options on the *Date Format* drop-down menu. Other date formats can be entered directly into the drop-down control.

Function Mode

You should set the *Function Mode radio* buttons to be in either novice or expert mode. In the Expert mode the *Function* and *End* statements are shown, in novice mode they are not.

Results Numeric Format

You can choose the format for the numeric results that are displayed in the *Run Analysis* dialog form the *Results Numeric Format* drop-down menu.

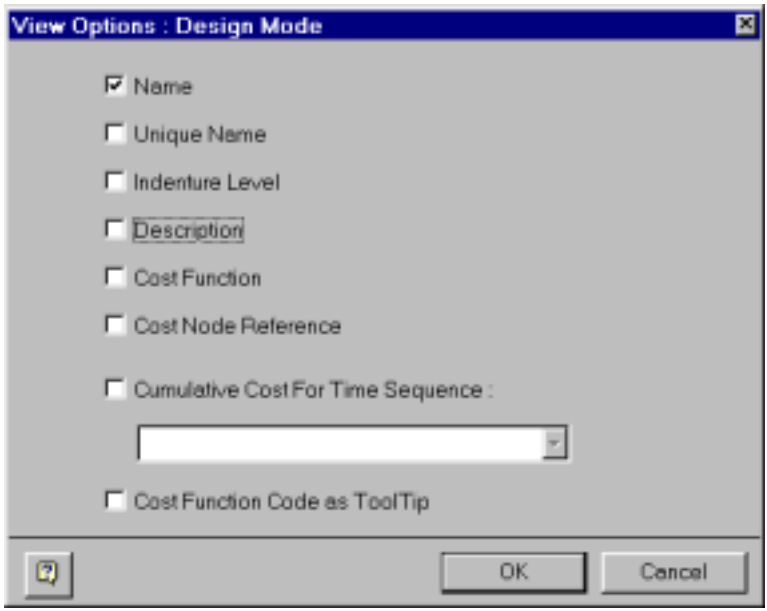
Perform Analysis at First Time Point

You should set the *Perform Analysis at First Time Point* radio buttons to specify whether or not the analysis will be carried out at the first time point. In some cases you will not want to calculate any results at the first time point but instead to start at the second time point. If you decide not to calculate results at the first time point then time dependent variable values will be grayed out for the first time point and no results will appear for this time point.

The *Project Description* Tab

This tab allows you to specify *System Description*, *Compiled By* and *Approved By* fields

The View Options Dialog



The check boxes allow you to specify which information is to be displayed next to each cost node in the cost tree:

Cost node name

Cost node unique name

Cost node description

Cost node indenture level

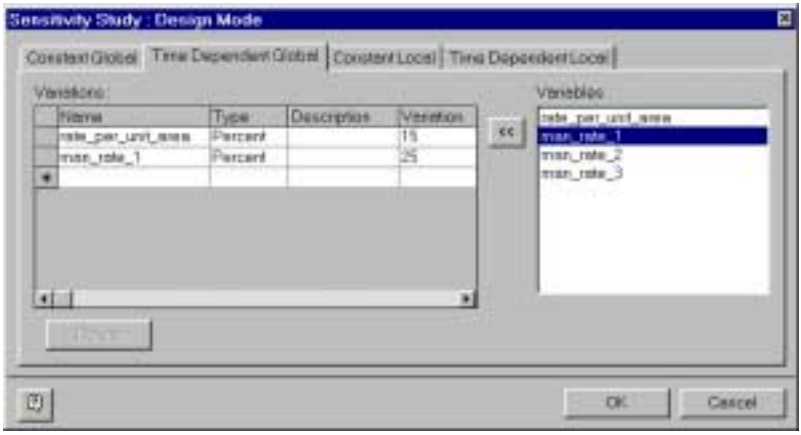
Cost function assigned to the cost node

Cost node reference assigned to the cost node

Cumulative cost for the cost node for the time sequence specified in the drop down menu

Cost Function equation displayed as a tool tip, this appears when you move the cursor over the cost node.

The Sensitivity Study Dialog



Selecting a Variable Type

Select either the *Constant Global Variables, Time Dependent Global Variables, Constant Local Variables* or the *Time Dependent Local Variables* tab to choose the required variable type.

Selecting a Variable to Vary

Select a variable from the *Variables* list and then select the << button. This will add the variable to the *Variations* list. The variation is set to 0.0 by default. Enter the required variation in the *Variation* column. Now select the variation type in the *Type* column. Three types are available : *percent, offset* and *absolute*. The *absolute* type can only be applied to constant global variables.

The variable value will be set as follows when the variation is processed in the analysis :

percent = original_value + (original_value) * variation / 100.0

offset = original_value + variation

absolute = variation

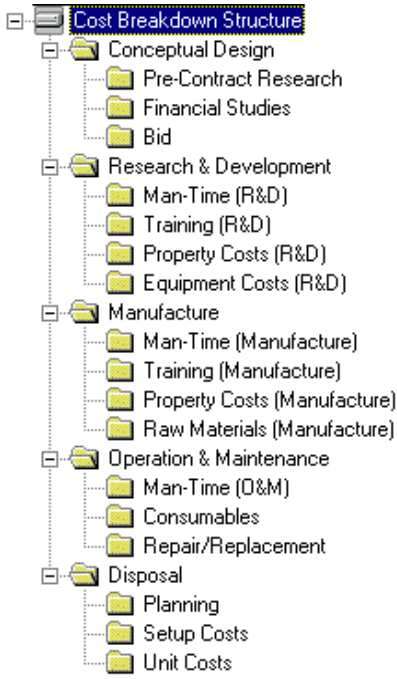
Deleting a Variation

Select a variation from the *Variations* list and then select the *Delete* button.

LccWare Tutorial

Introduction

lccWare allows you to calculate the life cycle cost of a system. The total cost will be made up of several cost categories that you will define, such as Research & Development, Operation & Maintenance and Disposal. The categories can be further sub-divided to a level at which you can calculate detailed cost values. This division of the total cost into sub-categories is known as the Cost Breakdown Structure (CBS). The CBS is represented in lccWare in the form of a tree.



The nodes on the tree represent the cost elements in the CBS. LccWare allows you the build the tree interactively and create your own CBS.

LccWare allows you to create cost functions that will be used to calculate the value of a cost category. These cost functions can range from simple equations to more complex calculations based on Visual Basic compatible coding.

You can easily assign the cost functions to the nodes on the cost tree so that lccWare can calculate the individual cost values.

The costs are calculated at user defined time points within the life cycle of the system. Each set of time points is called a time sequence and has a unique name. LccWare allows you to define more than one set of time points so that you can investigate the

effects of variations in the time points values and the values of variables.

You can define the variables that you wish to use in the cost calculations and supply values that are either constant over time or vary with time. You can assign values to the time varying variables at each of the time points in each time sequence.

When you have instructed lccWare to run a cost calculation you can examine the results in standard text or graph reports. You can also prepare your own reports and save the formats for future use.

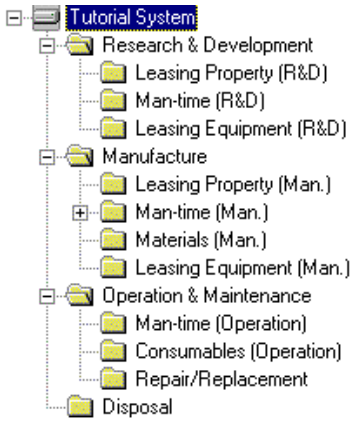
LccWare includes facilities for importing data from other software such as Microsoft Access, Microsoft Excel and text files. The software can also export to any of these file formats.

LccWare can also act as an OLE automation client and receive data from other OLE enabled products.

In this tutorial we will take a simple life cycle cost example and use it to illustrate the use of lccWare. Some of the capabilities of the software will not be covered in the tutorial for the sake of simplicity.

Life Cycle Cost Example

The simple example that we will use in this tutorial is based on the following cost breakdown structure.



The cost nodes in the cost breakdown structure will be:

- Research & Development
  - Leasing property
  - Leasing equipment
  - Man-time
- Manufacture
  - Leasing property
  - Leasing equipment
  - Materials
  - Man-time

Operations & Maintenance

Consumables

Repair/replacement

Man-time

Disposal

The cost breakdown structure will also represent the fixed cost of component maintenance using the part tree facility. The cost is fixed in the sense that the cost is independent of an individual cost node. This cost is applied to the cost breakdown structure by including a reference to the part tree in a cost function, and then applying the cost function to one or more cost nodes.

The part tree and part nodes will be:

Maintenance Cost

Components

Pump

Boiler

Turbine

Generator

The part tree will have two associated variables: Quantity (constant) and UnitCost (time-dependent). The sum total of the maintenance cost at each time point will be applied in the cost function using the *PartTreeValue* built-in function. The form of the cost function will be:

```
maintenance_cost =  PartTreeValue (  "Maintenance Cost",
                                     "Components",
                                     "Quantity",
                                      "SUM") *
                    PartTreeValue (  "Maintenance Cost",
                                     "Components",
                                     "UnitCost",
```

"SUM")

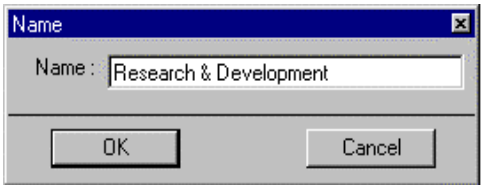
This will sum all the ‘Quantity’ and ‘UnitCost’ variables under the ‘Components’ part and multiply them together to generate the ‘maintenance_cost’ value. Because the *PartTreeValue* function must have a part name as one of its arguments the ‘Components’ part is added below the ‘Maintenance Cost’ part tree to act as the parent to all the child parts, and thereby generate a sum of the child part tree variable values.

Creating the Cost Tree

We need to start with a new project so choose the *File, New Project…* option if you are not already in a new project. We will change the name of the base node in the tree by selecting the *Cost Node* tab and replacing the contents of the *Name* field with ‘Tutorial System’.

Next you should select the base node. Choose the *Edit, Add Cost Node…* option, click on the *Add Cost Node* button on the toolbar or choose *Add Cost Node* from the right button pop-up menu.

Then type ‘Research & Development’ into the text box in the resulting *Name* dialog and click on the *OK* button.



The new node will then appear in the cost tree. You should repeat the process for the ‘Manufacture’, ‘Operation & Maintenance’ and ‘Disposal’ cost nodes.

We will now add the cost nodes below the ‘Research & Development’ node. First you should select the ‘Research &

Development' node by clicking on it. Then repeat the process of adding cost nodes for the 'Leasing Property (R&D)', 'Man-time (R&D)' and 'Leasing Equipment (R&D)' nodes.

Next we will add the cost nodes below the 'Manufacture' node. First you should select the 'Manufacture' node by clicking on it. Then repeat the process of adding cost nodes for the 'Leasing Property (Man.)', 'Man-time (Man.)', 'Materials (Man.)' and 'Leasing Equipment (Man.)' nodes.

Finally we will add the cost nodes below the 'Operations & Maintenance' node. First you should select the 'Operations & Maintenance' node by clicking on it. Then repeat the process of adding cost nodes for the 'Man-time (Operation)', 'Consumables (Operation)' and 'Repair/Replacement' nodes.

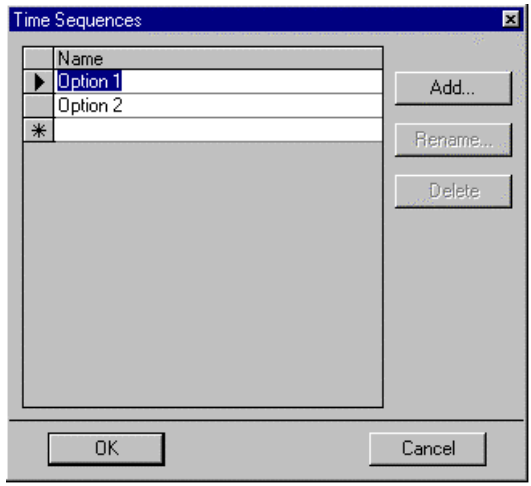
You have now created the cost tree for the tutorial.

Time Sequences and Time Points

We will now create the two time sequences for the tutorial example. You should choose the *Edit, Time Sequences…* menu option or click on the *Time Sequences* toolbar button.

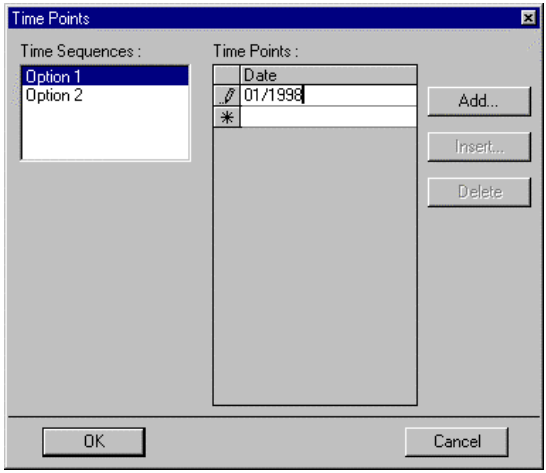
The *Time Sequences* dialog contains a grid into which you should type the names of the time sequences.

Type 'Option 1' into the first line then click on the second line and type in 'Option 2'.

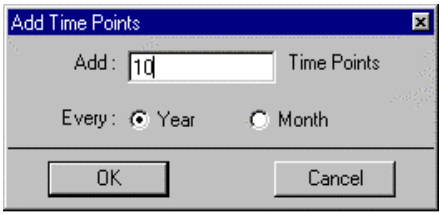


Then click on the *OK* button to dismiss the dialog.

We will next specify the time points in each of the time sequences. LccWare will calculate the values of the cost nodes at each of the time points. You should choose the *Edit, Time Points* menu option or the *Time Points* toolbar button.



First select the 'Option 1' time sequence by clicking on that name in the *Time Sequences* list. By default the initial time point is January 1998. You should next click on the *Add* button, which will reveal the *Add Time Points* dialog.



Make sure that the *Year* radio button is set, type '10' into the *Add:* field and click the *OK* button. The time points will now appear in the grid. Now select the 'Option 2' time sequence and repeat the process of adding ten time points. Now click on the *OK* button to dismiss the *Time Points* dialog.

Defining Global Variables

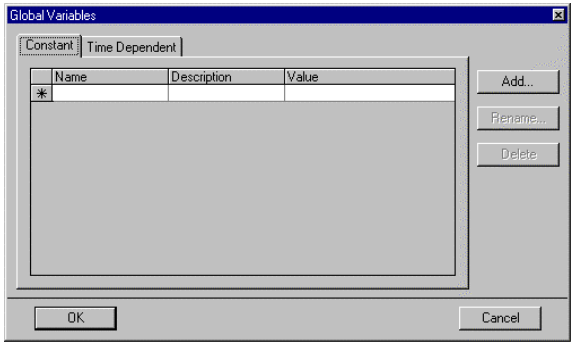
The cost equations that we will use for the various cost elements in the CBS will be composed of variables that we will create either at the time of defining the equations or prior to that stage in the case of 'global variables'. Global variables can be used in any of the cost equations.

As an example let us look at a simple cost equation for leasing property. The equation has the form:

lease_costs = area x rate_per_unit_area

This equation could be used to calculate the costs for leasing property in the Research & Development, Manufacture and Operations & Maintenance sections of the cost tree. In this case it would be a good idea to create 'rate_per_unit_area' as a global variable.

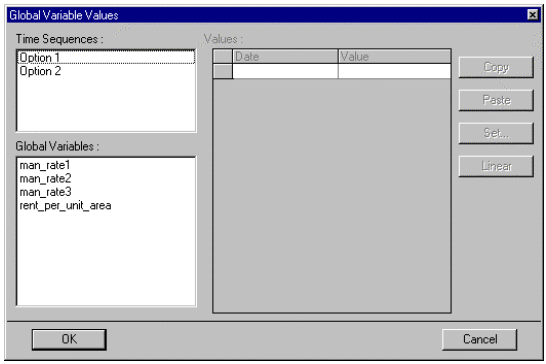
To create a global variable you should choose the *Edit, Global Variable, Create* menu option or click on the *Create Global Variable* toolbar button. The *Global Variables* dialog will then appear.



The *Constant* tab enables you to define global variables that do not vary through the time sequence. We will define global variables that do change with time so you should click on the *Time Dependent* tab. You should then click in the *Name* column and type 'rate_per_unit_area'. You can add a description by clicking in the *Description* column and then typing some text. Next click in the *Default Value* column and type in '100'. This value will be used as the default value of the variable at each of the time points, we will change it later in the tutorial.

Similarly, we will define global variables to hold the man-time cost rates for three categories of staff which will be used in different categories to calculate man-time costs. You should click in the *Name* column and type 'man_rate_1' then add your own description and input '40' as the default value. In the same way add global variables 'man_rate_2' and 'man_rate_3' with default values of 50 and 60 respectively. Now click the *OK* button to dismiss the *Global Variables* dialog.

We can modify the values of global variables by choosing the *Edit, Global Variables, Time Dependent Values* menu option or the *Global Variables Values* toolbar button. This will reveal the *Global Variables Values* dialog.



This dialog allows us to modify the values of the global variables at each time point in each time sequence. We will start by modifying the 'rate_per_unit_area' variable in the 'Option 1' time sequence. You should select 'Option 1' in the *Time Sequence* list and 'rate_per_unit_area' in the *Global Variables* list. The *Values* grid will then display the values at each time point. Initially these are the default value that you supplied when creating the variables. Let us assume that the value of this variable will rise from 100 to 120 during the life cycle of the system. You should select the value at the last time point by clicking on the number in the grid. You should then type in a new value of 120. Next select the whole row in the grid at this position by clicking on the button at the left of the row. Next select the first row in the grid but hold down the 'Ctrl' key whilst you click on the button at the left of the first row, this will cause the last row to remain selected. Now click on the *Linear* button and observe that the values are changed using linear interpolation between the first and last values. You should now repeat this process for the other variable/time sequence combinations and use the following linear interpolations.

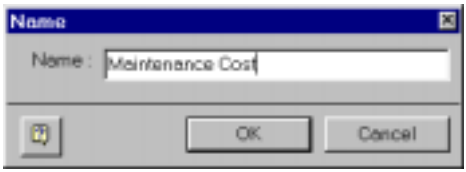
Variable	**Option 1**	**Option 2**
rate_per_unit_area	100 - 120	100 - 140
man_rate_1	40 - 50	40 - 60
man_rate_2	50 - 60	50 - 70

man_rate_3	60 - 70	60 - 80

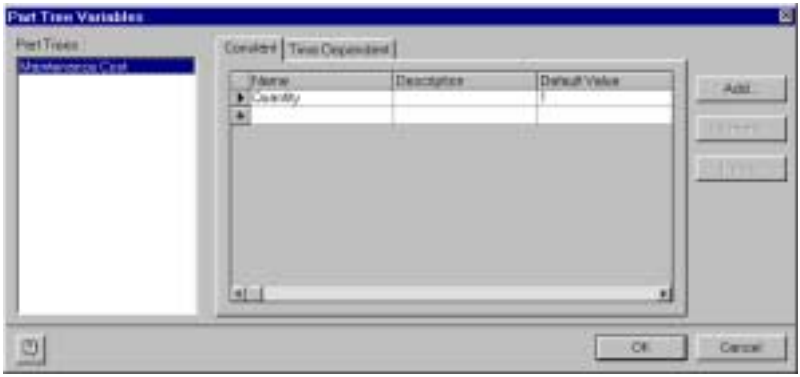
When you have completed this task you should click on the *OK* button to dismiss the *Global Variables Values* dialog.

Creating the Part Tree

To create the part tree first select the *Part Trees* tab at the bottom of the cost tree window. Next select the *Root* node and then select the *Edit, Add Part Tree* menu option. Type 'Maintenance Cost' into the text box in the resulting *Name* dialog and click on the *OK* button.



We will now add the constant and time dependent part tree variables associated with this part tree. Select the 'Maintenance Cost' part tree and then the *Edit, Part Tree Variables* menu option.



Select 'Maintenance Cost' from the *Part Trees* list. The *Constant* tab enables you to define part tree variables that do not vary

through the time sequence. Click in the name column and enter type ‘Quantity’. Now click in the *Default Value* column and type ‘1’.

Next select the *Time Dependent* tab to enter variables that vary in value throughout the time sequence. Click in the name column and type ‘UnitCost’. Now click in the *Default Value* column and type ‘10000’. Select the *OK* button to save the new variable and dismiss the dialog.

We will now add the parts below the part tree. Select the *Edit – Add Part* menu option and type ‘Components’ into the text box in the resulting *Name* dialog and click on the *OK* button. Now select the ‘Components’ part just added and repeat the above process to add the ‘Pump’, ‘Boiler’, ‘Turbine’ and ‘Generator’ parts.

Assigning Values to Part Tree Variables

We will now set the part tree variable values. The first task is to set the ‘Components’ part tree variable values to zero. This is because this part is acting as a container for its child components, and does not contribute to the total maintenance cost.

Select the ‘Components’ part in the part tree and then select the *Constant Variables* tab. Click in the *Value* column and type ‘0’.

Next select the *Time Dependent Variables* tab, select the time sequence ‘Option 1’ from the *Time Sequences* list and the variable ‘UnitCost’ from the *Variables* list. Now select the *Select All* button and then the *Set…* button. Type ‘0’ into the text box in the resulting *Set Value* dialog. Select the *OK* button to set all the values for the selected time sequence and variable to 0.

Repeat this set of actions for the time sequence ‘Option 2’.

The next task is to set the part tree variable values for the pump, boiler, turbine and generator components. This section will describe the process for setting the values for the pump component and then suggest values for the other components (these will match the tutorial example supplied with the lccWare installation).

Select the ‘Pump’ part in the part tree and then select the *Constant*

Variables tab. Click in the *Value* column and type '2'.

Next select the *Time Dependent Variables* tab, select the time sequence 'Option 1' from the *Time Sequences* list and the variable 'UnitCost' from the *Variables* list. Click in the *Value* column of the first row of the *Values* list and type '1000'. Now click in the last row and type '2000'. Select the record selector for the first row and then the record selector for the last row (this latter whilst pressing the *Ctrl* key). This process will select just the first and last records. Now select the *Linear* button to set all intermediate values to a linear interpolation between the first and last values.

Repeat this set of actions for the time sequence 'Option 2', except in this case the last value will be '3000'.

The values for the other components will be as follows :

Part	**Variable**	
Boiler	Quantity	
	1	
	Variable	
	UnitCost	
Year	**Option 1**	**Option 2**
1998 - 2008	2000	4000

Part	**Variable**	
Turbine	Quantity	
	1	
	Variable	
	UnitCost	

Year	Option 1	Option 2
1998 - 2008	500	Linear interpolation from 500 to 2000.

Part	Variable	
Generator	Quantity	
	2	
Year	**Option 1**	**Option 2**
1998 – 2000	800	Linear interpolation from 800 to 2400

Defining Cost Functions

We will now build the equations that will be used to calculate the cost elements on the cost tree. In our case the cost equations will be very simple but IccWare gives you the opportunity to create complex equations or even Visual Basic compatible functions.

Cost Function Man_Time

You should now choose the *Edit, Cost Functions* menu option or click on the *Cost Function* toolbar button. The resulting *Cost Functions* dialog contains a grid at the left side for the names and descriptions of the cost functions and a tabbed dialog at the right side. We will start by creating a general cost function for calculating man-time costs. We have already defined three global variables for man-time rates that are to be multiplied by man-hours to calculate the cost. You should click in the *Name* column and type ‘man-time’. You can also click in the *Description* column and type your own description. Next select the cost function by clicking

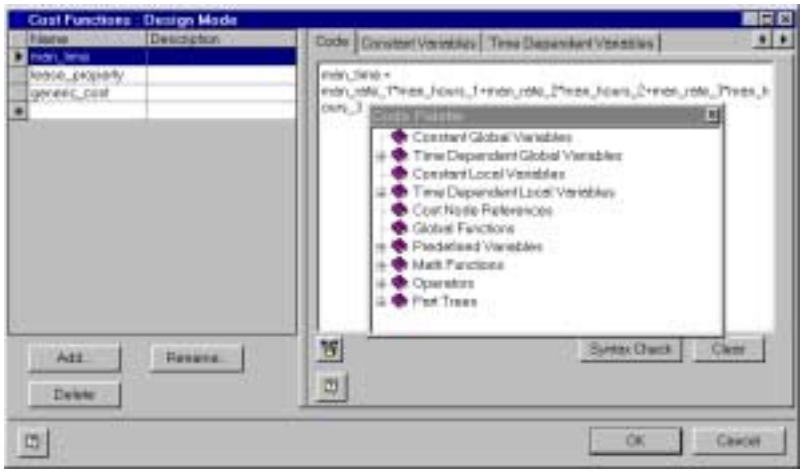
on the button at the left of the row after first clicking in next name field. You should then click on the *Code* tab. You will see in the upper left text input area that the equation for 'man_time' has already been started for you. We will use this area to build the cost functions. Now remember that the man-time cost function will have three terms, each of which is a man-time rate multiplied by the number of man-hours worked. The man-time rates have already been defined as global time dependent variables. We will now define the man-hours as 'local' time dependent variables. This means that when we assign this cost function to a cost node that we can assign man-hour values that are appropriate to that particular node, in other words they are 'local' variables.

You should now click on the *Time Dependent Variables* tab. You should now click in the *Name* field and type in 'man_hours_1', click in the *Description* field and type your own description and finally click in the *Default Value* field and type in '0'. You should now repeat the process for the variables 'man_hours_2' and 'man_hours_3' with the same default values.

You should now return to the *Code* tab and delete '<expression>' from the right side of the equation. You could replace this by typing the actual equation but you will probably find that using the 'drag and drop' features combined with the code palette pop-up window will be easier. The code palette is automatically displayed whenever the code tab is selected. If it is dismissed it can be re-displayed using the code palette button.

Select the *Time Dependent Globals* category in the code palette. You will see the list of time dependent global variables that you have created. In order to drag and drop one of the variables into the equation you should click on it with the left mouse button, keep the button depressed and then drag the variable into position in the equation. A cursor will appear when the variable is over the equation indicating the insertion position. When you release the left mouse button the variable will be placed in the equation. Start off by placing the variable 'man_rate_1' then type in the multiplication operator, '*'. The operator could also have been dragged and dropped from the *Operators* category list. Next select the *Time Dependent Locals* category and drag and drop the variable

'man_hours_1' into the equation. This process should be repeated for the 'man_rate_2/man_hours_2' and 'man_rate_3/man_hours_3' combinations separated by '+' signs. Finally, position the cursor at the end of the equation and press the *Return* key.



Cost Function Lease_Property

We will now create a general cost function for calculating leasing property costs. We have already defined a global variable for rent per unit area rates that are to be multiplied by a floor area to calculate the cost. You should click in the *Name* column and type 'lease_property'. You can also click in the *Description* column and type your own description. Next select the cost function by clicking on the button at the left of the row after first clicking in next name field. You should then click on the *Code* tab. You will see in the upper left text input area that the equation for 'lease_property' has already been started for you. The rent per unit area rates have already been defined as a global time dependent variable. We will now define the floor space as a 'local' time dependent variable.

You should now click on the *Time Dependent Variables* tab. You should now click in the *Name* field and type in 'floor_area', click in the *Description* field and type your own description and finally click in the *Default Value* field and type in '0'.

You should now return to the *Code* tab and delete '<expression>' from the right side of the equation. First select the *Time Dependent Globals category* from the code palette. Use drag and drop to place the variable 'rent_per_unit_area' then type in the multiplication operator, '*'. Next select the *time dependent locals* category and drag and drop the variable 'floor_area' into the equation.

Cost Function Generic_Cost

In the interest of simplicity we will create an extra cost function that is simply a generic annual cost. We will apply this to several of the cost nodes to represent different types of annual cost. You should click in the *Name* column and type 'generic_cost'. You can also click in the *Description* column and type your own description. Next select the cost function by clicking on the button at the left of the row after first clicking in next name field. You should then click on the *Code* tab. You will see in the upper left text input area that the equation for 'generic_cost' has already been started for you. We will now define the generic annual cost as a 'local' time dependent variable.

You should now click on the *Time Dependent Variables* tab. You should now click in the *Name* field and type in 'annual _cost', click in the *Description* field and type your own description and finally click in the *Default Value* field and type in '0'.

You should now return to the *Code* tab and delete '<expression>' from the right side of the equation. Next select the *Time Dependent Locals* category in the code palette and drag and drop the variable 'annual_cost' into the equation.

Cost Function Maintenance_Cost

Finally we will create a cost function representing the maintenance cost of the pump, boiler, turbine and generator. The cost will be based on values retrieved from the 'Maintenance Cost' part tree. This example will demonstrate the ease of including part tree variable values in a cost function. Later in the tutorial we will apply this cost function to the 'Repair/Replacement' cost node. You should click in the *Name* column and type 'maintenance_cost'. You can also click in the *Description* column and type your own

description. Now save the cost function by clicking in next name row. Select the cost function by clicking on the row selector.

You should now click on the *Code* tab. You will see in the upper left text input area that the equation for 'maintenance_cost' has already been started for you. Delete '<expression>' from the right side of the equation. You could replace this by typing the actual equation but you will probably find that using the 'drag and drop' features, combined with the code palette pop-up window, will be much easier, especially when creating references to part tree variables. The code palette is automatically displayed whenever the code tab is selected. If it is dismissed it can be re-displayed using the code palette button. Select the *Part Trees – Maintenance Cost – Components* folder in the code palette and drag and drop the 'Quantity' variable into the equation. This will automatically generate the call to the PartTreeValue function, including all the correct arguments. Now type ' * ' into the equation and then drag and drop the 'UnitCost' variable into the equation from the code palette. The equation should now be:

```
maintenance_cost =   PartTreeValue (  "Maintenance Cost",
                                      "Components",
                                      "Quantity",
                                       "SUM") *
                     PartTreeValue (  "Maintenance Cost",
                                      "Components",
                                      "UnitCost",
                                      "SUM")
```

We have now completed the cost function definitions for the sample project. You should dismiss the *Cost Function* dialog by clicking on the *OK* button.

Assigning Cost Functions to Cost Nodes

We have already constructed the cost tree and defined some simple cost functions, it is now time to assign cost functions to the relevant cost nodes on the tree and to specify the values of local variables.

You should start by selecting the cost node named ‘Leasing Property (R&D)’. Make sure that the *Cost Node* tab is visible and the click on the *Cost Function* drop-down menu. This menu allows you to assign a cost function to the cost node, you should select ‘lease_property’. Next click on the *Time Dependent Variables* tab which will show that we have one such variable, ‘floor_area’. This dialog allows you to specify the floor space used in each time period, in this case annually, for this cost node. This shows the use of the local variable concept. First select ‘Option 1’ from the list of time sequences. Set the values at the second, third, fourth and fifth years of the project to ‘2000’ by over typing the values and leave the later years at zero. Next select the time sequence ‘Option 2’ and set the values for the second, third, fourth and fifth years to ‘2500’. You can do this by over typing the values as before or you could try the following method. Re-select ‘Option 1’ and click on the *Select All* button and then the *Copy* button. Next select ‘Option 2’ and select the first row in the grid by clicking on the button at the left of the row. When you then click on the *Paste* button you will see that the grid values for ‘Option 1’ have been copied into the ‘Option 2’ grid. Next press the *Select All* button and then the *Multiply* button, you can then type ‘1.25’ as a multiplying factor which will produce the necessary values in the grid.

You should now repeat these procedures and assign cost functions to cost nodes, define local variables and set values of local variables as set out in the tables below. However, if you wish to skip this task you can use the *File, Open Project* menu option to open the file ‘tutex.lcw’ in the ‘Examples’ directory.

Cost Node	**Cost Function**	
Man-time (R&D)	man_time	
	Variable	
	man_hours_1	
Year	**Option 1**	**Option 2**

1998	0	0
1999 – 2002	20000	25000
2003 - 2008	0	0
	Variable	
	man_hours_2	
Year	**Option 1**	**Option 2**
1998	0	0
1999	1000	1200
2000	1500	1800
2001	1000	1200
2002	500	600
2003 – 2008	0	0
	Variable	
	man_hours_3	
Year	**Option 1**	**Option 2**
1998	0	0
1999	800	1000
2000	900	1125
2001	900	1125
2002	500	625

2003 - 2008	0	0

Cost Node	**Cost Function**	
Leasing Equipment (R&D)	generic_cost	
	Variable	
	annual_cost	
Year	**Option 1**	**Option 2**
1998	0	0
1999	150000	165000
2000	150000	165000
2001	120000	132000
2002	100000	110000
2003 – 2008	0	0

Cost Node	**Cost Function**	
Leasing Property (Man.)	leasing_property	
	Variable	
	floor_area	

Year	Option 1	Option 2
1998 – 2000	0	0
2001 - 2007	3000	3500
2008	0	0

Cost Node	Cost Function	
Man-time (Man.)	man_time	
	Variable	
	man_hours_1	
Year	**Option 1**	**Option 2**
1998 - 2001	0	0
2002 - 2007	15000	20000
2008	0	0
	Variable	
	Man_hours_2	
Year	**Option 1**	**Option 2**
1998 - 2001	0	0
2002 - 2006	8000	9000
2007 – 2008	0	0

	Variable	
	Man_hours_3	
Year	**Option 1**	**Option 2**
1998 - 2000	0	0
2001 - 2007	10000	12000
2008	0	0

Cost Node	**Cost Function**	
Materials (Man.)	generic_cost	
	Variable	
	annual_cost	
Year	**Option 1**	**Option 2**
1998 – 2000	0	0
2001 – 2003	75000	80000
2004 – 2006	80000	85332
2007	85000	90666
2008	0	0

Cost Node	**Cost Function**	
Leasing Equipment (Man.)	generic_cost	

	Variable	
	annual_cost	
Year	**Option 1**	**Option 2**
1998 – 2000	0	0
2001 – 2003	125000	130000
2004 – 2007	130000	135200
2008	0	0

Cost Node	**Cost Function**	
Man-time (Operation)	man_time	
	Variable	
	man_hours_1	
Year	**Option 1**	**Option 2**
1998 – 2001	0	0
2002 – 2007	25000	30000
2008	0	0
	Variable	
	Man_hours_2	

Year	**Option 1**	**Option 2**
1998 – 2001	0	0
2002 – 2006	8000	9000
2007 – 2008	0	0
	Variable	
	Man_hours_3	
Year	**Option 1**	**Option 2**
1998 – 2000	0	0
2001 – 2007	12000	13000
2008	0	0

Cost Node	**Cost Function**	
Consumables (Operation)	generic_cost	
	Variable	
	annual_cost	
Year	**Option 1**	**Option 2**
1998 – 2000	0	0
2001 – 2003	25000	30000
2004 - 2006	30000	36000
2007	35000	42000

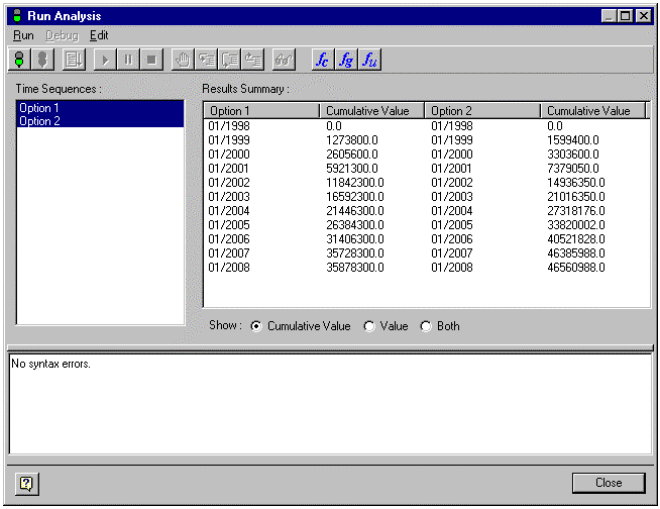
2008	0	0

Cost Node	**Cost Function**	
Repair /Replacement	maintenance_cost	

Cost Node	**Cost Function**	
Disposal	generic_cost	
	Variable	
	annual_cost	
Year	**Option 1**	**Option 2**
1998 - 2006	0	0
2007 – 2008	150000	175000

Running an Analysis

We are now at the stage of being able to instruct lccWare to analyse the life cycle cost model. You should choose the *Analysis, Run* menu option or the *Run Analysis* toolbar button to reveal the *Run Analysis* dialog. Next click on the 'Option 1' time sequence then click on the 'Option 2' time sequence with the Ctrl key pressed down so that both sequences are selected.



You should now click on the *Run* button to start the analysis. Any errors will be reported in the area in the lower part of the window. The cumulative cost results for each time sequence will be displayed in the upper right area. You can use the radio buttons to change the output to cost results and/or cumulative cost results.

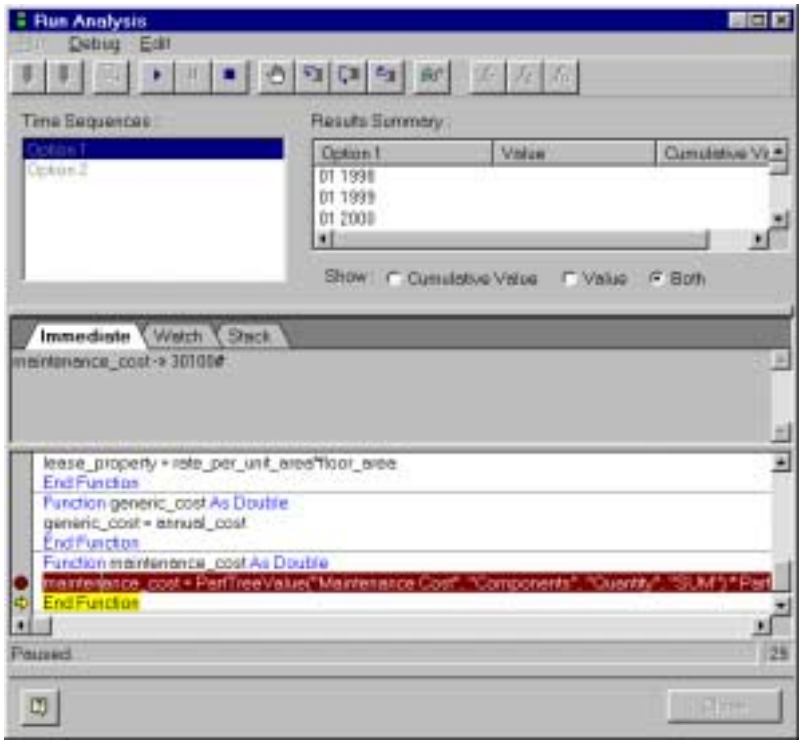
Debugging an Analysis

It is possible to examine the calculation process through the cost functions using the debug facility of the *Run Analysis* dialog. This facility enables any coding errors to be quickly located.

In this case we will check on the value returned by the 'maintenance_cost' function at each time point in the 'Option 1' time sequence. From the *Run Analysis* dialog select the *Start Debugger* toolbar button. This will display the debugger code window in place of the message window. Scroll down the code window until the 'maintenance_cost' function is visible. Now click on the 'maintenance_cost = ... ' code line and then select the *Toggle Breakpoint* toolbar button to set a breakpoint on the selected line.

Select the *Go* toolbar button to start the debugger (this will display

the watch window above the code window). Execution will stop at the selected breakpoint. This represents the first call to the 'maintenance_cost' function: the first time point at the 'Repair/Replacement' cost node. Now step execution past the call to the PartTreeValue function using the *Step Over Function* toolbar button. We can now examine the value of the 'maintenance_cost' function by clicking on the function name and then selecting the *Quick Watch* toolbar button. The value (which should be 30100) will be displayed in the watch window.



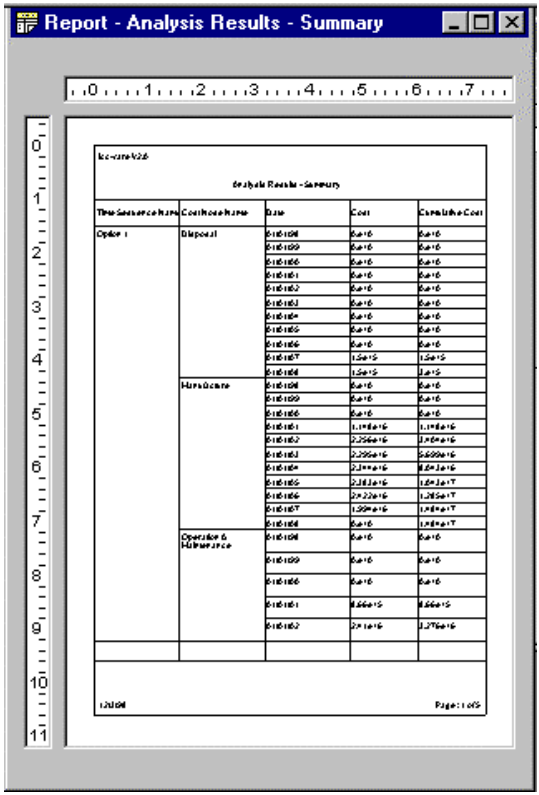
You can now step through each time point in the time sequence by repeatedly selecting the *Go* button. Alternatively the debug process can be terminated using the *End* toolbar button.

Reporting on Analysis Results

The reporting features in IccWare include standard text and graph reports. There is also the facility for the user to create new reports and save them for future use. The last facility is beyond the scope of this tutorial.

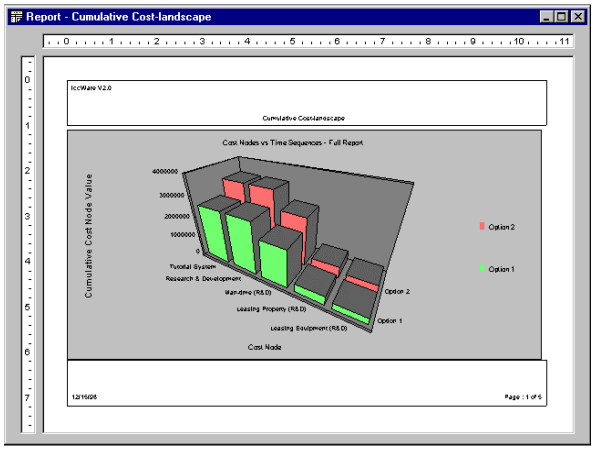
The standard reports may be previewed or printed directly to a printer. For the purposes of this tutorial we will preview a standard text and graph report.

You should first choose the *File, Print Preview …* menu option which will display the *Report Explorer* dialog. You should select the *Analysis Results – Summary* report from the *Text Reports/Results* folder and click on the *Open* button. The report will then be displayed in preview mode.



You can see the report more clearly by setting the *View, Fit to Screen* menu option off. The arrow buttons on the toolbar enable you to move between pages in the report.

Next you should choose the *File, Report Explorer…* menu option which will reveal the *Report Explorer* dialog. You should select the *Analysis Results - Cumulative Cost* report from the *Graph Reports/Results* folder and click on the *Open* button. The report will then be displayed in preview mode.



Again you can see the report more clearly by setting the *View, Fit to Screen* menu option off.

To display a report containing the structure of the cost tree in diagrammatic format choose the *Cost Nodes – Expanded* report from the *Diagram Reports* folder in the *Report Explorer.*

You can print the reports by first selecting the one you require then choosing either the *File, Print…* menu option or the *Print Report* toolbar button.

‘How To …’

This section provides a quick reference on how to carry out various tasks in lccWare.

How to Create a Cost Node

In order to create a cost tree you must first open a new project by choosing the *File, New Project…* option or equivalent toolbar button if you are not already in a new project.

There are three methods of creating cost nodes. The first method uses the *Edit, Add Cost Node* facility, the second uses the C*ut, Copy* and *Paste* options and the third uses *drag* and *drop.* These alternatives are explained in the following paragraphs.

After opening a new project the root node will be selected and its name will be highlighted. Next choose the *Edit, Add Cost Node…* option, click on the *Add Cost Node* button on the toolbar or choose *Add Cost Node* from the right button pop-up menu. Then type a cost node unique name into the text box in the resulting *Name* dialog (this is also assigned to the cost node name) and click on the *OK* button. The new node will then appear in the cost tree as a child of the root node. You can repeat the process for as many new nodes as you wish to create at this level in the tree structure, each cost node must have a unique name (the cost node name does not have to be unique). You can create child cost nodes below any existing cost node by first selecting the existing node and then follow the procedure to add a node as described above.

You can move or copy existing cost nodes and their children by first selecting the node and then copying it by choosing the *Cut* or *Copy* options on the *Edit* menu or the right button pop-up menu or the equivalent toolbar buttons. The *Cut* option will delete the selected node and its children after copying them to the clipboard. The copied nodes can then be added to the tree by first selecting the node at which they are to be added and then choosing the *Paste* option. Because each cost node must have a unique name the copied node will initially be given the unique name ‘copy of xyz’, where xyz is the unique name of the original node. You can

change these names by selecting a node in the tree and then edit its unique name in the *Unique Name* field in the *Cost Node* tab.

You can also use the *drag and drop* facility to move or copy nodes. If the *Ctrl* key is pressed during the drop operation, the nodes will be copied; otherwise they will be moved. First select the node to be copied then place the cursor over the node and keeping the left mouse button pressed down, drag the cursor to the node where the node is to be copied whilst pressing the *Ctrl* key, then release the left button. The selected node and any children will be copied to the specified position in the tree. The nodes will be removed from their original position if the *Ctrl* key is not pressed.

How to Delete a Cost Node

A selected cost node and any children can be deleted from the tree by choosing the *Edit, Delete* menu option or the *Delete* option on the right button pop-up menu.

How to Reorder the Cost Tree

A selected node can be moved in the tree structure by choosing the *Edit, Move Cost Node, Up* or *Edit, Move Cost Node, Down* menu options. These options move the selected node, and any children, up or down by one position at a time on the same indenture level of the tree.

How to Find a Cost Node

It may be difficult to locate a particular tree node on a large tree so the *Edit, Find Cost Node* menu option has been included in IccWare. You should type the name of the required node into the *Name* dialog and then the tree will be moved, if necessary, so that the node will appear selected in the viewing area.

How to Create a Part Tree and Parts

There are three methods of creating part trees and parts. The first method uses the *Edit - Add Part Tree* or *Edit – Add Part* menu option, the second uses the C*ut* (parts only)*, Copy* and *Paste* options and the third uses *drag* and *drop.* These alternatives are explained in the following paragraphs.

To create a part tree select the part trees root. Next choose the *Edit, Add Part Tree…* option or choose *Add Part Tree* from the right button pop-up menu. Then type the part tree name into the text box in the resulting *Name* dialog and click on the *OK* button. The new part tree will then appear as a child of the root. You can repeat the process for as many new part trees as you wish to create. Each part tree must have a unique name.

To create a part below any existing part tree or part first select an existing part tree or part and then choose the *Edit, Add Part…*

option or choose *Add Part* from the right button pop-up menu. Then type the part name into the text box in the resulting *Name* dialog and click on the *OK* button. The new part will then appear as a child of the selected part tree or part. You can repeat the process for as many new parts as you wish to create. All the parts associated with an individual part tree must have a unique name.

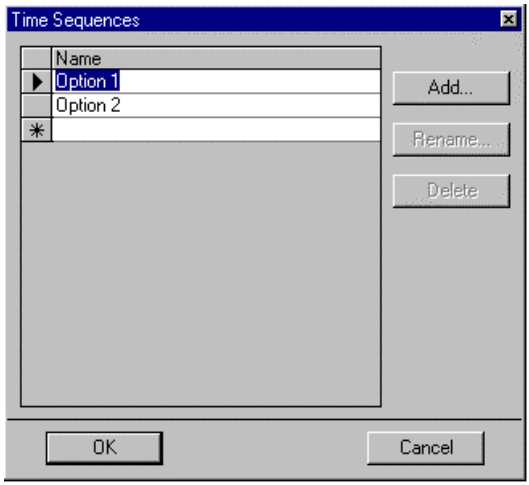
You can move or copy existing part trees or parts and their children by first selecting the part tree or part and then copying it by choosing the *Cut* (parts only) or *Copy* options on the *Edit* menu or the right button pop-up menu or the equivalent toolbar buttons. The *Cut* option will delete the selected part and its children after copying them to the clipboard. The copied part trees or parts can then be added to the tree by first selecting the part tree or part at which they are to be added and then choosing the *Paste* option. Because each part tree or part under a part tree must have a unique name any copied non-unique items will be given the name 'copy of xyz', where xyz is the name of the original item. You can change these names by selecting a part tree or part and then edit its name in the *Name* field in the *Part Tree/Part* tab.

You can also use the *drag and drop* facility to move or copy part trees or parts. If the *Ctrl* key is pressed during the drop operation, the nodes will be copied; otherwise they will be moved. First select the part tree or part to be copied then place the cursor over the selection and keeping the left mouse button pressed down, drag the cursor to the part tree or part where the selection is to be copied whilst pressing the *Ctrl* key, then release the left button. The selected part tree or part, and any children, will be copied to the specified target position. If the selection is a part then the selected parts and any children will be removed from their original position if the *Ctrl* key is not pressed.

How to Create a Time Sequence and Associated Time Points

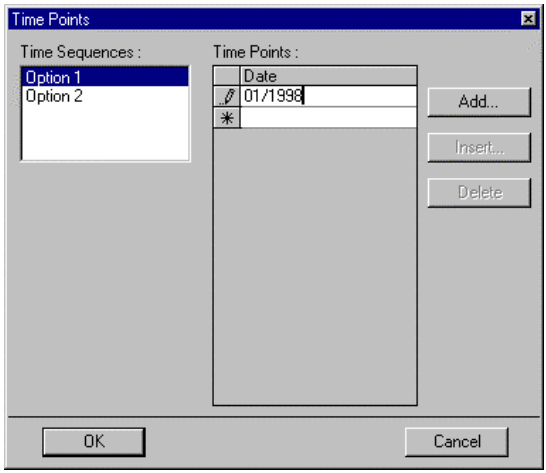
To create a time sequence you should choose the *Edit, Time Sequences…* menu option or click on the *Time Sequences* toolbar button.

The *Time Sequences* dialog contains a grid into which you should type the names of the time sequences. For instance type ‘Option 1’ into the first line then click on the second line and type in ‘Option 2’.

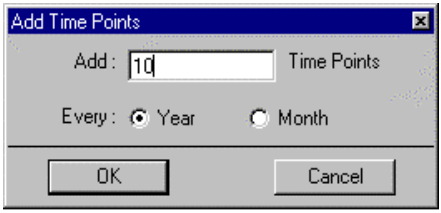


Then click on the *OK* button to dismiss the dialog.

We will next specify the time points in each of the time sequences. LccWare will calculate the values of the cost nodes at each of the time points. You should choose the *Edit, Time Points* menu option or the *Time Points* toolbar button.



First select the 'Option 1' time sequence by clicking on that name in the *Time Sequences* list. By default the initial time point is January 1998. You should next click on the *Add* button, which will reveal the *Add Time Points* dialog.



You can set either the *Year* or *Month* radio buttons and then type the number of time points that you require into the *Add:* field and click the *OK* button. The time points will now appear in the grid. You can repeat the process of adding time points for any other time sequences that have been created.

How to Create Global Variables

The cost equations that we will use for the various cost elements in the Cost Breakdown Structure (CBS) will be composed of various

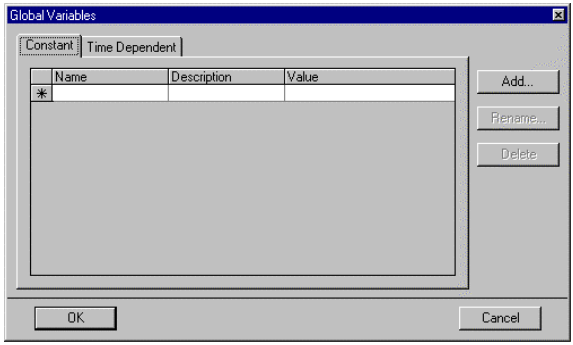
types of variables and functions. Global variables can be defined and can then be used in any of the cost equations.

As an example let us look at a simple cost equation for leasing property. The equation has the form:

lease_costs = area x rate_per_unit_area

This equation could be used to calculate the costs for leasing property in several parts of the cost tree. In this case it would be a good idea to create 'rate_per_unit_area' as a global variable.

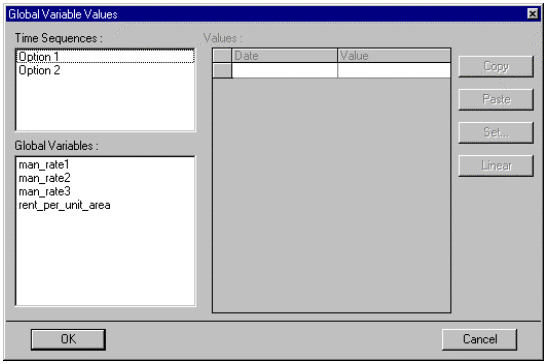
To create a global variable you should choose the *Edit, Global Variable, Create* menu option or click on the *Create Global Variable* toolbar button. The *Global Variables* dialog will then appear.



The *Constant* tab enables you to define global variables that do not vary through the time sequence. We will create a global variable that does change with time so you should click on the *Time Dependent* tab. You should then click in the *Name* column and type 'rate_per_unit_area'. You can add a description by clicking in the *Description* column and then typing some text. Next click in the *Default Value* column and type in '100'. This value will be used as the default value of the variable at each of the time points, you can change this at a later stage. Similarly, you can define more global variables.

You can modify the values of global variables by choosing the *Edit, Global Variables, Time Dependent Values* menu option or the

Global Variables Values toolbar button. This will reveal the *Global Variables Values* dialog.

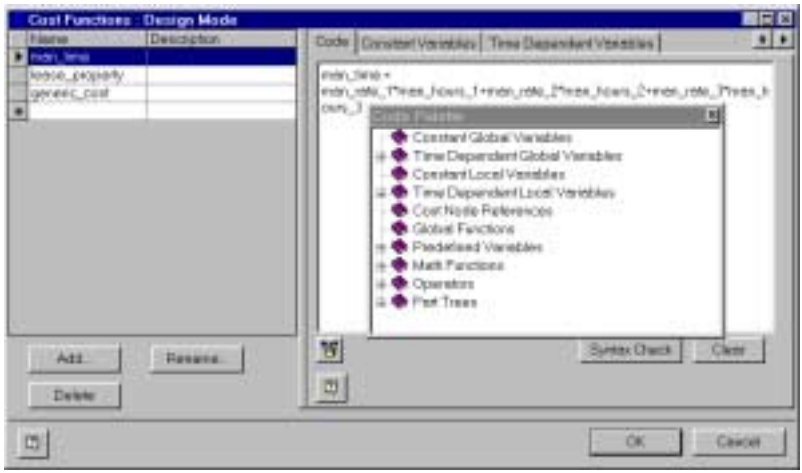


This dialog allows you to modify the values of the global variables at each time point in each time sequence. You should select a time sequence name in the *Time Sequence* list and a global variable name in the *Global Variables* list. The *Values* grid will then display the values at each time point. Initially these are the default value that you supplied when creating the variables. There are several ways of modifying the values including direct overwriting and specifying linearly increasing values. The details of these methods will be found in the section on assigning global variable values.

How to Define Cost Functions

The cost functions will be used to calculate the cost elements on the cost tree. The cost equations may be very simple one line equations but lccWare also gives you the opportunity to create complex equations or even Visual Basic compatible functions.

You should now choose the *Edit, Cost Functions* menu option or click on the *Cost Function* toolbar button.



The resulting *Cost Functions* dialog contains a grid at the left side for the names and descriptions of the cost functions and a tabbed dialog at the right side. We will start by creating a general cost function for calculating man-time costs. To create a new cost function you should click in the *Name* column and type the name of the function, for example 'man_time'. You can also click in the *Description* column and type your own description. Next select the cost function by clicking on the button at the left of the row after first clicking in next name field. You should then click on the *Code* tab. You will see in the upper left text input area that the equation for 'man_time' has already been started for you. You will use this area to build the cost functions. Assume that the man-time cost equation will have one term, which is a man-time rate multiplied by the number of man-hours worked and that the man-time rate has already been defined as a global time dependent variable. We will now define the man-hours as a 'local' time dependent variable. This means that when we assign this cost function to a cost node that we can assign man-hours values that are appropriate to that particular node, in other words they are 'local' variables.

You should now click on the *Time Dependent Variables* tab. You should now click in the *Name* field and type in 'man_hours_1', click in the *Description* field and type your own description and finally click in the *Default Value* field and type in '0'.

You should now return to the *Code* tab and delete '<expression>' from the right side of the equation. You could replace this by typing the actual equation but you will probably find that the 'drag and drop' features of the code palette will be easier. First select the *Time Dependent Globals* folder. You will see a list of time dependent global variable that you have created. In order to drag and drop one of the variables into the equation you should click on it with the left mouse button, keep the button depressed and then drag the variable into position in the equation. A cursor will appear when the variable is over the equation indicating the insertion position. When you release the left mouse button the variable will be placed in the equation. Start off by placing the variable for the man time rate then type in the multiplication operator, '*'. The operator could also have been dragged and dropped from the *operators* category list. Next select the *Time Dependent Locals* folder and drag and drop the variable 'man_hours_1' into the equation. Finally, position the cursor at the end of the equation and press the *Return* key.

You have now completed the cost function definition for the simple example. You should dismiss the *Cost Function* dialog by clicking on the *OK* button.

How to Use a Part Tree Variable in a Cost Function

The PartTreeValue function is used to include part tree variable values in cost equations. . The PartTreeValue function parameters are as follows :

PartTreeValue (PartTree as String, Part as String,
PartTreeVariable as String, Type as String)

Valid values for Type are :

SUM	Function returns value of part and all it's children for the specified part tree variable.
PART	Function returns value of part for the specified part tree variable.

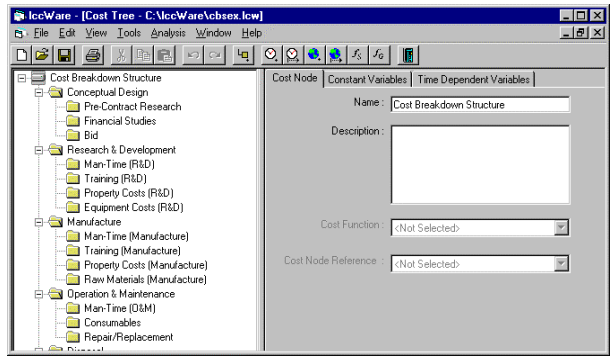
Example :

Man_time = PartTreeValue("Car", "Engine", "Cost", "SUM")

Using the code palette is the best method of generating a call to the PartTreeValue function in a cost equation. The part tree and parts hierarchy are represented by a series of folders in the code palette. Part tree variables are represented as nodes within part folders. To include a part tree variable value in a cost equation simply select a required variable node and drag and drop it into the cost equation. This will automatically create a call to the PartTreeValue function with the correct parameters.

How to Assign Cost Functions to Cost Nodes and Set Associated Local Variable Values

You should start by selecting the cost node to which you intend to assign a cost function. Make sure that the *Cost Node* tab is visible and the click on the *Cost Function* drop-down menu. This menu allows you to assign a cost function to the cost node, you should select the required cost function name. Next click on the *Time Dependent Variables* tab which will show a list of such variables. First select a time sequence name from the list of time sequences and the local variable name. The grid of time points and time values will then appear at the right side of the dialog.

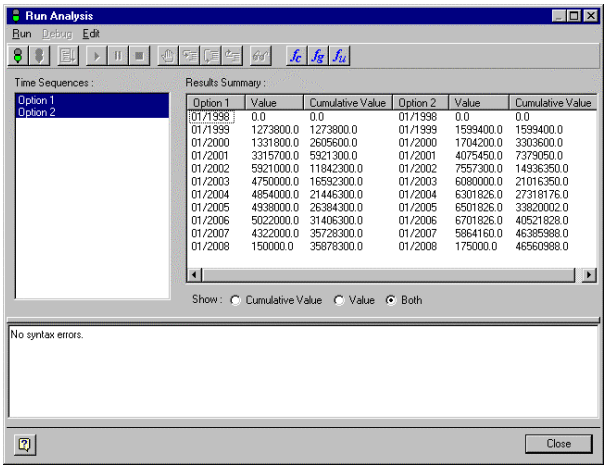


Initially these are set to the default value that you supplied when creating the variables. There are several ways of modifying the

values including direct overwriting and specifying linearly increasing values. The details of these methods will be found in the section on assigning local variable values.

How to Run an Analysis

You should choose the *Analysis, Run* menu option or the *Run Analysis* toolbar button to reveal the *Run Analysis* dialog. Next select the time sequence names that you wish to include in the calculation.

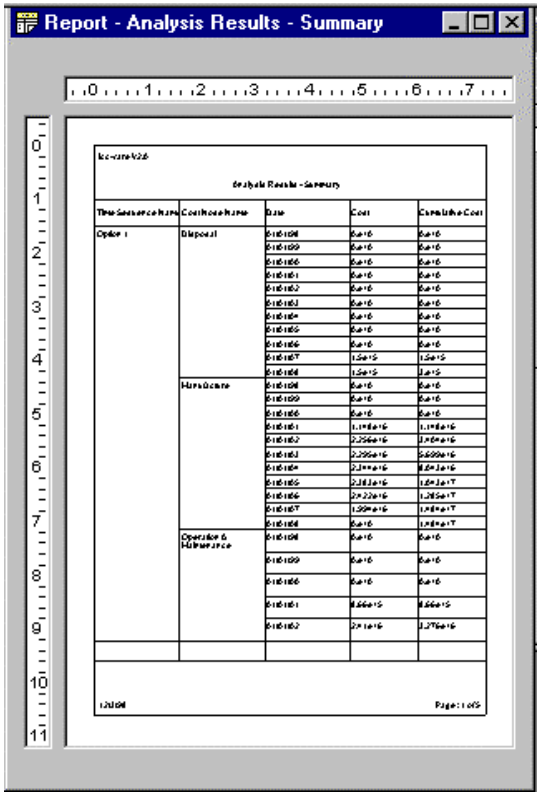


You should choose the *Run, Start Analysis* menu option or click on the *Start Analysis* toolbar button to start the analysis. Any errors will be reported in the area in the lower part of the window. The cumulative cost results for selected time sequences will be displayed in the upper right area.

How to Report on Analysis Results

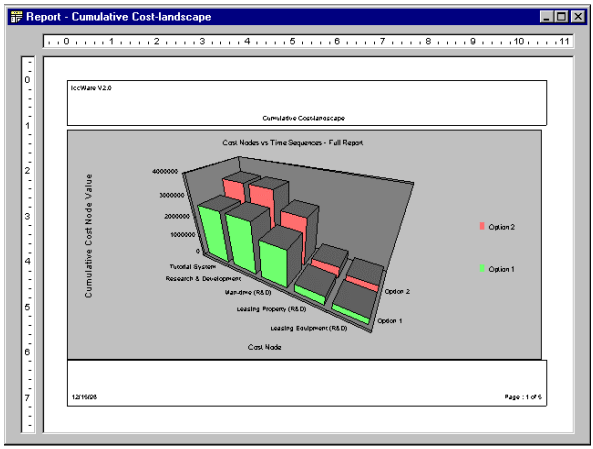
The reporting features in IccWare include standard text and graph reports. There is also the facility for the user to create new reports and save them for future use. The standard reports may be previewed or printed directly to a printer.

To preview a text report you should first choose the *File, Print Preview, Text Report…* menu option which will reveal the *Open Text Report for Print Preview* dialog. You should select for instance the *Analysis Results – Summary* report and click on the *Open* button. The report will then be displayed in preview mode.



You can see the report more clearly by setting the *View, Fit to Screen* menu option off. The arrow buttons on the toolbar enable you to move between pages in the report.

To preview a graph report you should choose the *File, Open, Graph Report…* menu option which will reveal the *Open Graph Report for Print Preview* dialog. You should select the *Analysis Results - Cumulative Cost* report and click on the *Open* button. The report will then be displayed in preview mode.



Again you can see the report more clearly by setting the *View, Fit to Screen* menu option off.

You can print the reports by first selecting the one you require then choosing either the *File, Print…* menu option or the *Print Report* toolbar button, assuming that your computer is connected to a printer!

Reporting

Overview

You can print, preview and design reports by selecting the appropriate options on the IccWare *File* pull-down menu. There are three different types of reports. They are :

- Text Reports
- Graph Reports
- Diagram Reports

All the reporting functions provided by IccWare are handled by the Report Generator. The Report Generator is a generic facility which also provides the reporting functionality for other applications.

The Report Generator is a very powerful and flexible tool which allows you to design your own customised text reports and graphs as well as selecting standard reports provided with the application.

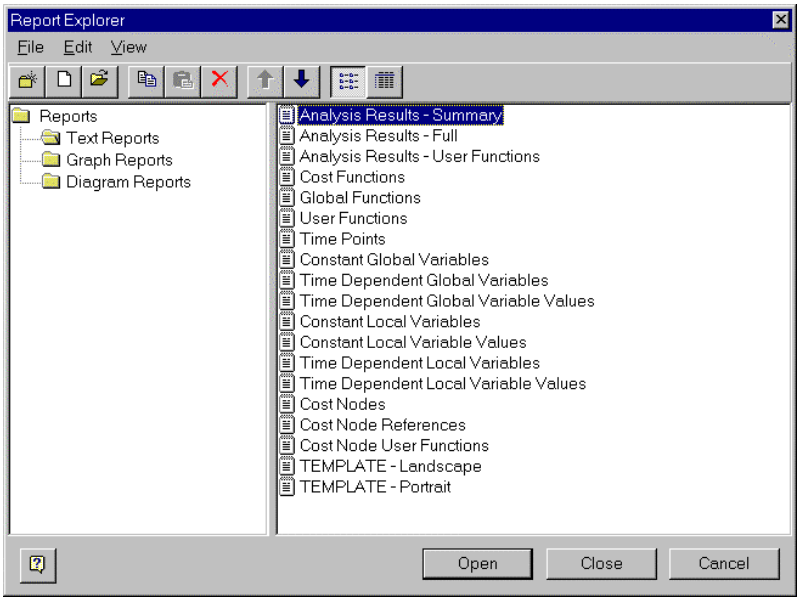
The Report Generator may operate in a number of different configurations. For example, it may operate in a configuration suitable for designing new reports or modifying existing reports or it may operate in a configuration suitable for previewing reports.

One or more report windows may be opened for an IccWare. These windows are displayed inside the IccWare main window. When the IccWare user selects a Report Generator function the Report Generator toolbar and menus replace the IccWare toolbar and menus.

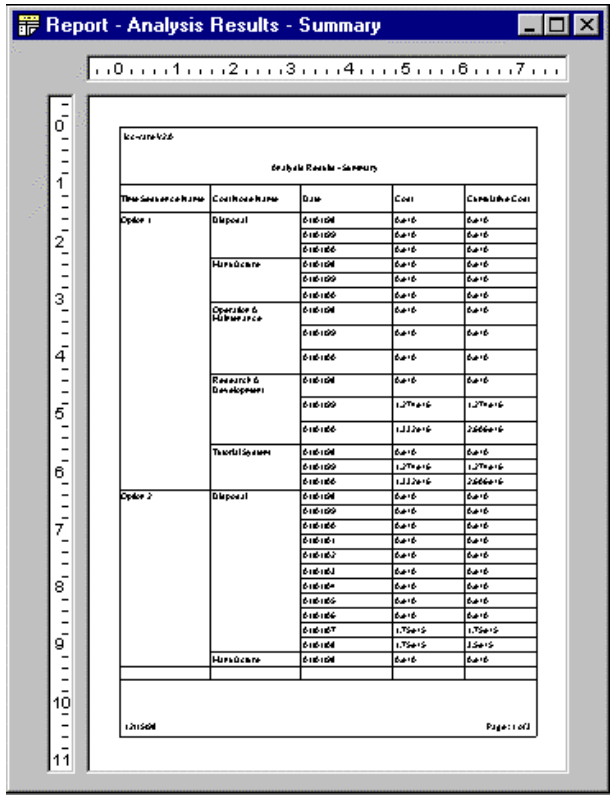
Previewing Reports

A variety of standard report types are provided to allow you to easily preview and print input data and calculation results from your IccWare project. You may print reports without previewing them first simply by selecting the *File, Print* menu option from within IccWare. Alternatively, you may preview and then print a report by first selecting the *File, Print Preview* menu option from within IccWare.

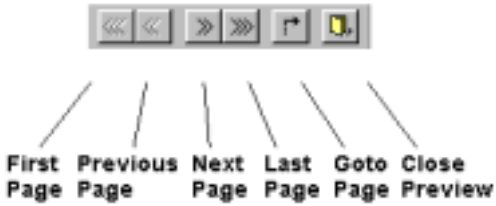
Selection of the IccWare *File, Print Preview* menu option displays the *Report Explorer* dialog.



The user then selects the required report from this dialog and the report is displayed in a child window inside the IccWare main window.



Various menu options are available for navigating through the report, changing the report layout, printing the report etc. For example the user can view a different page in the report by selecting options on the *Preview* menu or selecting the equivalent toolbar options.



Reports may be printed from preview mode by selecting the *Print* option on the *File* menu in the Report Generator.

To preview a different report simply select the Report Generator *File, Open* menu option and select a new report from the *Report Explorer* dialog.

When you have finished previewing data you may close the report window by selecting the *Close* menu option from the *File* menu.

Printing Reports

The user can print pre-defined reports by choosing one of the options on the lccWare *File, Print* menu.

Selection of any of these choices on the lccWare File menu starts up the Report Generator which then displays a dialog from which the user selects a particular report type. The report types displayed will be identical to the list provided when in print preview mode.

Selection of the required report type then leads to a standard *Print* dialog.

Once a report has been printed the user may select another report from the list or select the *Close* button to exit from the Report Generator.

Importing and Exporting Data

Overview

lccWare provides extensive import and export facilities allowing users to transfer project data to and from Microsoft Access compatible databases, Microsoft Excel worksheets and text files.

The lccWare project database structure is described in Appendix IV. Some of the tables in the database are combined to provide a more useful interface for the import and export facilities. It is this combination of derived and original tables that is presented in the import/export dialogs and is described in Appendix III.

A common terminology will be used to describe the structure of each of the import/export file types. This will be based on a database structure in which each database is composed of tables. Each table is composed of records and records are made up of fields. For instance a lccWare project database has tables such as the *Cost Nodes* Table which holds information on the Cost Nodes in the Cost Tree. The tables contain records for each Cost Node and these records contain fields called Cost Node *Name*, *Description* and so on. An Excel workbook is equivalent to the database and contains worksheets that correspond to tables. The worksheets are arranged in tabular form with rows corresponding to records that contain fields. A text file corresponds to a single table. The file contains records that are composed of fields.

Both the import and export features are accessed from options on the lccWare *File* menu.

The user should choose the *File, Export* menu option to begin the process of specifying the data to export. The *Export* program will then appear.

The user should choose the *File, Import* menu option to begin the process of specifying the data to import. The *Import* program will then appear.

The *Import* and *Export* programs are generic facilities providing import and export facilities for several applications. The detailed descriptions for each program make no explicit reference to IccWare, referring instead to the ‘application'.

Appendix I - What Is...

What is a :

Time Sequence

A time sequence is the name of a set of time points. LccWare calculates the costs associated with cost nodes on the Cost Breakdown Structure at each time point in a time sequence. Time dependent variables can have different values at each time point in each time sequence, constant variables have the same value at each time point.

Time Point

Time points are the dates at which cost calculations are to be carried out. A set of time points from the beginning to end of a life cycle is known as a time sequence. LccWare calculates the costs associated with cost nodes on the Cost Breakdown Structure at each time point in a time sequence. Time dependent variables can have different values at each time point in each time sequence, constant variables have the same value at each time point.

Cost Node

Cost nodes are the constituents of the cost tree which represents the cost breakdown structure. Each cost node represents a cost element in the cost breakdown structure. The cost associated with a cost node is generated from the cost function associated with that node.

Cost Function

A cost function is an equation or Visual Basic compatible function that is used to calculate the cost of a particular node in a cost tree. A cost function is evaluated at each time point in a time sequence. A cost function can consist of a combination of constant and time dependent local or global variables. Time dependent variables can have different values at each time point in each time sequence. Constant variables have the same value at each time point.

Global Variable

A global variable is a variable that has a value at each time point in a time sequence and which can be used in any cost function, global function or user function in the IccWare model.

Local Variable

A local variable is a variable that has a value at each time point in a time sequence and which is associated with a particular cost function and the cost node to which it is assigned.

Global Function

Global functions are Visual Basic like functions that can be used to carry out certain operations or calculate values. Global functions can be used in cost or user functions. A set of pre-named global functions is supplied with IccWare that are automatically executed at certain stages of the calculation.

User Function

User functions are Visual Basic like functions that can be assigned to cost nodes to carry out various ancillary calculations. The input arguments to these functions are the current time point cost and cumulative cost at the node to which the function is assigned.

Cost Node Reference

A cost node reference is the name given to a child cost node, which is then used to represent the cost of the child node in a cost function assigned to the parent cost node. In normal circumstances the cost of a parent node is the sum of the costs of the child nodes. However, IccWare gives you the flexibility to override this in the cost function assigned to the parent node.

Part Tree

Part trees provide the user with a convenient method of assigning the costs associated with a frequently used piece of equipment (and it's constituent parts) to a cost function.

Part

Parts represent the components of the equipment referred to by a part tree. For example part tree *car* might have parts *engine* and *gearbox*.

Part Tree Variable

Part tree variables are user defined variables associated with a part tree. These variables are used to represent attributes of the parts, for example cost.

These variables may be either constant or time dependent. Constant part tree variables have a value at each part in their associated part tree. Time dependent part tree variables have values at each part, time sequence and time point combination in their associated part tree.

These values are included in cost functions using the *PartTreeValue* function call.

Predefined Variables

A set of predefined variables is provided for your convenience. These variables give you access to useful parameters that can be included in the cost function calculation. The variables are explained below :

LCW_TSEQ

This variable is set to the name of the current time sequence. It is a ‘String’ data type.

LCW_TPNT

This variable is set to the value of the current time point. It is a ‘Date’ data type.

LCW_TPNT_INDEX

This variable is set to the index of the current time point. It is a ‘Integer’ data type. The index starts at 1 for the first time point.

LCW_TPNT_YEARDIFF

This variable is set to the difference between the current time point and the last time point, measured in years. It is a ‘Integer’ data type. The value is set to zero for the first time point. Since this variable is an integer, fractional values are rounded down to the next lower integer.

LCW_TPNT_MNTHDIFF

This variable is set to the difference between the current time point and the last time point, measured in months. It is a ‘Integer’ data type. The value is set to zero for the first time point.

LCW_TPNT_DAYDIFF

This variable is set to the difference between the current time point and the last time point, measured in days. It is a ‘Integer’ data type. The value is set to zero for the first time point.

Appendix II - Detailed Explanation of Cost Calculation

Overview

The nodes on the lccWare cost tree represent the cost elements through the lifetime of your system.

LccWare allows you to create cost functions that will be used to calculate the value of a cost category. These cost functions can range from simple equations to more complex calculations based on Visual Basic compatible coding.

You can easily assign the cost functions to the nodes on the cost tree so that lccWare can calculate the individual cost values.

The costs are calculated at user defined time points within the life cycle of the system. Each set of time points is called a time sequence and has a unique name. LccWare allows you to define more than one set of time points so that you can investigate the effects of variations in the time points values and the values of variables.

You can define the variables that you wish to use in the cost calculations and supply values that are either constant over time or vary with time. You can assign values to the time varying variables at each of the time points in each time sequence.

In addition to constant or tabular variables you can create ‘global functions’. For example, these functions could be used to calculate values be used in cost function calculations where a variable can be represented by a function.

LccWare also has the facility to create ‘user functions’. These functions can be assigned to any cost node and can be used to perform ancillary calculations such as the Present Value of a cost. Any number of user functions can be assigned to a single cost node.

The purpose of this section is to explain the details of how you can use these various functions and variables in your calculations.

Cost Functions

The cost function that evaluates the cost at a cost node can be either a simple equation or a more extensive Visual Basic like function. In either case the following elements can be used to create the function :

Constant Global Variables

A constant global variable has a single value that is constant in time. You can use the variable in any cost function because it is a global variable. It is possible to change the value of the variable by placing it on the left-hand side of a statement in the function.

Time Dependent Global Variables

A time dependent global variable has a value at each time point in each time sequence in the IccWare model. You can use the variable in any cost function because it is a global variable. It is possible to change the value of the variable at a particular time point by placing it on the left-hand side of a statement in the function.

Constant Local Variables

A constant local variable has a single value that is constant in time. You can use the variable and set its value each time you assign the cost function to a cost node, in this sense the variable is ‘local’ to this instance of the function. It is possible to change the value of the variable by placing it on the left-hand side of a statement in the function.

Time Dependent Local Variables

A time dependent local variable has a value at each time point in each time sequence in the IccWare model. You can use the variable and set its value each time you assign the cost function to a cost node, in this sense the variable is ‘local’ to this instance of the function. You can use the variable in any cost function because it is a global variable. It is possible to change the value of the variable at a particular time point by placing it on the left-hand side of a statement in the function.

Part Tree Variables

Constant part tree variables have a value at each part in their associated part tree. Time dependent part tree variables have values at each part, time sequence and time point combination in their associated part tree.

These values are included in cost functions using the *PartTreeValue* function call.

Predefined Variables

A set of predefined variables is provided for your convenience. These variables give you access to useful parameters that can be included in the cost function calculation. The variables are explained below:

LCW_TSEQ

This variable is set to the name of the current time sequence. It is a 'String' data type.

LCW_TPNT

This variable is set to the value of the current time point. It is a 'Date' data type.

LCW_TPNT_INDEX

This variable is set to the index of the current time point. It is a 'Integer' data type. The index starts at 1 for the first time point.

LCW_TPNT_YEARDIFF

This variable is set to the difference between the current time point and the last time point, measured in years. It is a 'Integer' data type. The value is set to zero for the first time point. Since this variable is an integer, fractional values are rounded down to the next lower integer.

LCW_TPNT_MNTHDIFF

This variable is set to the difference between the current time point and the last time point, measured in months. It is a 'Integer' data type. The value is set to zero for the first time point.

LCW_TPNT_DAYDIFF

This variable is set to the difference between the current time point and the last time point, measured in days. It is a 'Integer' data type. The value is set to zero for the first time point.

Global Functions

You can create global functions that can then be used in the cost function calculation. A set of pre-defined global function shells is supplied with lccWare, these functions are called at certain stages of the calculation process as described later in this section. You can add your coding to these shells knowing that they will be called at the appropriate times.

User supplied global functions are evaluated as they are encountered in cost functions.

You can declare variables in the 'Declarations' section that can be used in any of the global functions. You need to ensure that they are declared as 'Public', e.g.

Public value_1 as Integer

The pre-defined global functions are called as follows:

InitialiseTimeSequence

At the beginning of each time sequence

InitialiseTimePoint

At the beginning of each time point

TerminateTimeSequence

At the end of each time sequence

TerminateTimePoint

At the end of each time point

In addition to the variables defined in the 'Declarations' section, global functions can also contain constant and time dependent global variables, predefined variables and math functions.

Math Functions

You are supplied with a set of math functions that can be included in the cost calculation. These functions are equivalent to those available in Visual Basic.

Abs(x)

Returns magnitude of x, i.e. the sign is ignored

Atn(x)

Returns arctangent of x, the result is in radians

Cos(x)

Returns cosine of x, x is in radians

Exp(x)

Returns e (the base of natural logarithms) raised to a power x

Fix(x)

Returns the first integer less than or equal to x

Log(x)

Returns the natural logarithm of a x

Rnd()

Returns a random number

Randomize()

Before calling Rnd, use the Randomize statement without an argument to initialize the random-number generator with a seed based on the system timer

Sgn(x)

Returns an Integer indicating the sign of x

If x is	Sgn returns
Greater than zero	1
Equal to zero	0
Less than zero	-1

Sin(x)

Returns the sine of x, x is in radians

Sqr(x)

Returns the square root of a x

Tan(x)

Returns the cosine of x, x is in radians

Operators

The operators are equivalent to those used in Visual Basic. Most are well known but you will probably need an explanation for some of the following:

+

Addition, x + y

-

Subtraction, x - y

*

Multiplication, x * y

/

Used to divide two numbers and return a floating-point result, x / y

^

Exponentiation, e.g. x^y, x raised to the power of y

=

equals, x = y

Mod

The syntax is as follows:

x mod y

The modulus, or remainder, operator divides x by y (rounding floating-point numbers to integers) and returns only the remainder as result

\

Used to divide two numbers and return an integer result, x \ y

&

Used to force string concatenation of two expressions, str1 & str2

<>

Comparison operator, Not Equal To, x <> y

<

Comparison operator, Less Than, x < y

>

Comparison operator, Greater Than, x > y

<=

Comparison operator, Less Than or Equal To, x <= y

>=

Comparison operator, Greater Than or Equal To, x >= y

Not

Logical operator, Not x

And

Logical operator, x And y

Or

Logical operator, x Or y

Xor

Logical operator, x Xor y

Eqv

Logical operator, expression1 Eqv expression2

The Eqv operator performs a bitwise comparison of identically positioned bits in two numeric expressions and sets the corresponding bit in result according to the following table:

If bit in expression1 is	And bit in expression2 is	The result is
0	0	1
0	1	0
1	0	0
1	1	1

Imp

Logical operator, expression1 Imp expression2

The Imp operator performs a bitwise comparison of identically positioned bits in two numeric expressions and sets the corresponding bit in result according to the following table:

If bit in expressio	And bit in expression2 is	The result is

n1 is		
0	0	1
0	1	1
1	0	0
1	1	1

User Functions

User functions can be assigned to cost nodes and can process the local cost or accumulated cost. User functions are useful for ancillary calculations such as evaluating the Present Value of costs. User functions can be either a simple equation or a more extensive Visual Basic like function. In either case the following elements can be used to create the function.

Constant Global Variables

Time Dependent Global Variables

Predefined Variables

Global Functions

Math Functions

Operators

The details of these elements can be found in the section on cost functions above.

Calculation Order

Most lccWare users will not need to know about the details of how the software calculates the results. However, if you are one of the minority of users who are using lccWare for more complex calculations, you may need to know the order in which the calculations are made as shown below.

Set Constant Global Variables

- Start the loop over the Time Sequences
  - Evaluate Constant Part Tree Variables
  - Evaluate Time Dependent Part Tree Variables
  - Start the loop over Sensitivity Studies
    - Set LCW_TSEQ
    - Call InitialiseTimeSequences
    - Start loop over Time Points
      - Set LCW_TPNT
      - Set LCW_TPNT_INDEX
      - Set LCW_TPNT_YEARDIFF
      - Set LCW_TPNT_MNTHDIFF
      - Set LCW_TPNT_DAYDIFF
      - Set Time Dependent Global Variables
      - Call InitialiseTimePoint
      - Call Cost Functions
        - Set Constant Local Variables
        - Set Time Dependent Local Variables
        - Calculate Cost Node References
        - Evaluate Global Functions
        - Evaluate User Functions
      - Call TerminateTimePoint
    - End loop over Time Points
    - Call TerminateTimeSequence
  - End loop over Sensitivity Studies
- End loop over Time Sequences

Appendix III- Import/Export Database Tables

This appendix documents the data tables that can be exported and imported from IccWare. This appendix differs from *Appendix IV - IccWare Project Database* in documenting only the tables and fields available for export (and their associated option names and attributes).

NB: Fields of type *Text* can hold up to 255 characters, fields of type *Memo* can hold up to 1.2 Gbytes.

Cost Functions

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Name	Text		Yes	
Description	Text			
Text	Memo			
Cost Node Reference Mode	Long Integer			0 – Sum of Child Node Costs 1 – Cost Node Reference Variables

Global Functions

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Name	Text		Yes	
Description	Text			
Text	Memo			
Function Type	Long Integer			0 - Declaration 1 - Initialise Time Sequence 2 - Initialise Time Point

				3 - Terminate Time Sequence 4 - Terminate Time Point 5 - Global Function

User Functions

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Name	Text		Yes	
Description	Text			
Text	Memo			

Time Sequences

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Name	Text		Yes	

Time Points

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Time Sequence Name	Text		Yes	
Date	Date		Yes	
Start Date	Boolean	Yes		

Constant Global Variables

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Name	Text		Yes	
Description	Text			
Value	Double			

Constant Global Variable Sensitivity

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Variable Name	Text		Yes	
Description	Text			
Type	Long Integer			0 – Percent 1 – Offset 2 – Absolute
Variation	Double			

Time Dependent Global Variables

On import records in this table can only be overwritten, not appended.

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Name	Text		Yes	
Description	Text			
Default Value	Double			

Time Dependent Global Variable Values

On import records in this table can only be overwritten, not appended.

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Time Sequence Name	Text	Yes	Yes	
Variable Name	Text	Yes	Yes	
Date	Date	Yes	Yes	
Start Date	Boolean	Yes		
Description	Text	Yes		
Default Value	Double	Yes		
Value	Double			

Time Dependent Global Variable Sensitivity

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Variable Name	Text		Yes	
Description	Text			
Type	Long Integer			0 – Percent 1 – Offset 2 – Absolute
Variation	Double			

Cost Nodes

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Unique Name	Text		Yes	
Parent Unique Name	Text			
Cost Node Name	Text			
Cost Function Name	Text			
Description	Text			
Indenture Level	Text	Yes		
Node Level	Long Integer	Yes		0 - Root node 1 - Children of root node 2 - etcetera...
Display Order	Long Integer			0 - Top node of group 1 - Next to top node of group

Cost Node References

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Cost Function Name	Text		Yes	
Reference	Text		Yes	

Name				
Description	Text			

Cost Node User Functions

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Cost Node Unique Name	Text		Yes	
User Function Name	Text		Yes	

Constant Local Variables

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Cost Function Name	Text		Yes	
Variable Name	Text		Yes	
Description	Text			
Default Value	Double			

Constant Local Variable Values

On import records in this table can only be overwritten, not appended.

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments

Cost Function Name	Text	Yes	Yes	
Variable Name	Text	Yes	Yes	
Cost Node Name	Text	Yes	Yes	
Description	Text	Yes		
Default Value	Double	Yes		
Value	Double			

Constant Local Variable Sensitivity

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Cost Function Name	Text		Yes	
Variable Name	Text		Yes	
Variation	Double		Yes	
Description	Text			
Type	Long Integer			0 – Percent 1 – Offset 2 – Absolute

Time Dependent Local Variables

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments

Cost Function Name	Text		Yes	
Variable Name	Text		Yes	
Description	Text			
Default Value	Double			

Time Dependent Local Variable Values

On import records in this table can only be overwritten, not appended.

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Cost Function Name	Text	Yes	Yes	
Variable Name	Text	Yes	Yes	
Cost Node Name	Text	Yes	Yes	
Time Sequence Name	Text	Yes	Yes	
Date	Date	Yes	Yes	
Start Date	Boolean	Yes		
Description	Text	Yes		
Default Value	Double	Yes		
Value	Double			

Time Dependent Local Variable Sensitivity

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Cost Function Name	Text		Yes	
Variable Name	Text		Yes	
Variation	Double		Yes	
Description	Text			
Type	Long Integer			0 – Percent 1 – Offset 2 – Absolute

Part Trees

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Name	Text		Yes	
Description	Text			
Display Order	Long Integer			
Expanded	Boolean			

Parts

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Part Tree Name	Text		Yes	

Part Name	Text		Yes	
Parent Part Name	Text			
Description	Text			
Display Order	Long Integer			
Expanded	Boolean			
Node Level	Integer			

Constant Part Tree Variables

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Part Tree Name	Text		Yes	
Variable Name	Text		Yes	
Description	Text			
Default Value	Double			

Constant Part Tree Variable Values

On import records in this table can only be overwritten, not appended.

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Part Tree Name	Text		Yes	
Variable Name	Text		Yes	
Part Name	Text		Yes	

Description	Text	Yes		
Default Value	Double	Yes		
Value	Double			

Time Dependent Part Tree Variables

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Part Tree Name	Text		Yes	
Variable Name	Text		Yes	
Description	Text			
Default Value	Double			

Time Dependent Part Tree Variable Values

On import records in this table can only be overwritten, not appended.

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Part Tree Name	Text		Yes	
Variable Name	Text		Yes	
Part Name	Text		Yes	
Time Sequence Name	Text		Yes	
Date	Date		Yes	

Start Date	Boolean	Yes		
Description	Text	Yes		
Default Value	Double	Yes		
Value	Double			

Analysis Results

This table can only be exported. The index field setting is not applicable.

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Time Sequence Name	Text			
Cost Node Name	Text			
Date	Date			
Start Date	Boolean			
Node Level	Long Integer			
Cost Node Value	Double			
Cumulative Cost Node Value	Double			
Sensitivity Variable Name	Text			
Sensitivity Variable Type	Long Integer			0 – None 1 – Constant Global

				2 – Time Dependent Global 3 – Constant Local 4 – Time Dependent Local
Sensitivity Variation Type	Long Integer			0 – Percent 1 – Offset 2 – Absolute
Sensitivity Description	Text			
Sensitivity Variation	Double			

User Function Results

This table can only be exported. The index field setting is not applicable.

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Time Sequence Name	Text			
Cost Node Name	Text			
User Function Name	Text			
Date	Date			
Start Date	Boolean			
Node Level	Long Integer			

Value	Double			
Cumulative Value	Double			
Sensitivity Variable Name	Text			
Sensitivity Variable Type	Long Integer			0 – None 1 – Constant Global 2 – Time Dependent Global 3 – Constant Local 4 – Time Dependent Local
Sensitivity Variation Type	Long Integer			0 – Percent 1 – Offset 2 – Absolute
Sensitivity Description	Text			
Sensitivity Variation	Double			

Part Tree Results - Constant Variables

This table can only be exported. The index field setting is not applicable.

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Part Tree Name	Text			
Part Name	Text			

Variable Name	Text			
Node Level	Long Integer			
Part Tree Display Order	Long Integer			
Part Display Order	Long Integer			
Sum Value	Double			
Part Value	Double			

Part Tree Results – Time Dependent Variables

This table can only be exported. The index field setting is not applicable.

Field Name	Type	Import Disabled?	Index Field	Option Names/Comments
Time Sequence Name	Text			
Date	Date			
Start Date	Boolean			
Part Tree Name	Text			
Part Name	Text			
Variable Name	Text			
Node Level	Long Integer			
Part Tree Display	Long			

Order	Integer			
Part Display Order	Long Integer			
Sum Value	Double			
Part Value	Double			

Appendix IV - IccWare Project Database

This appendix describes the IccWare project database tables. This description is intended as a reference for users requiring to programmatically access the IccWare project file.

NB: Fields of type *Text* can hold up to 255 characters, fields of type *Memo* can hold up to 1.2 Gbytes.

Cost Functions

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
Name	Text	Unique	
Description	Text		
Text	Memo		Function code.
Cost Node Reference Mode	**Integer**		0 - Sum cost nodes 1 - Use cost node references

Global Functions

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
Name	Text	Unique	
Description	Text		
Text	Memo		Function code.
Function Type	Integer		0 - Global Declaration 1 - Initialise Time Sequence 2 - Initialise Time Point 3 - Terminate Time Sequence 4 - Terminate Time Point 5 - Global Function

User Functions

Name	Type	Indexed	Comments
ID	Long	Primary	

	Integer		
Name	Text	Unique	
Description	Text		
Text	Memo		Function code.

Time Sequences

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
Name	Text	Unique	
Results Up To Date	Boolean		

Results Up To Date

Name	Type	Indexed	Comments
TimeSequenceID	Long Integer	Primary	FK:[Time Sequences].[ID]
Results Up To Date	Boolean		False - Results are out of date True - Results are up to date

Time Points

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
TimeSequenceID	Long Integer	Unique	FK:[Time Sequences].[ID]
Time Sequence Name	Text		Used only for import/export
Date	Date /Time		
Start Date	Boolean		If True then first date in time sequence.

Constant Global Variables

Name	Type	Indexed	Comments

ID	Long Integer	Primary	
Name	Text	Unique	
Description	Text		
Value	Text		

Constant Global Variable Sensitivity

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
ConstantGlobal VariableID	Long Integer		FK:[Constant Global Variables].[ID]
Variable Name	Texr		Used only for import/export
Description	Text		
Type	Integer		0 - Percent 1 - Offset 2 - Absolute
Variation	Double		

Time Dependent Global Variables

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
Name	Text	Unique	
Description	Text		
Default Value	Text		

Time Dependent Global Variable Values

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
TimeDependent GlobalVariableID	Long Integer		FK:[Time Dependent Global Variables].[ID]
TimePointID	Long Integer		FK:[Time Points].[ID]
Value	Text		

Time Dependent Global Variable Sensitivity

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
TimeDependentGlobalVariableID	Long Integer		FK:[Time Dependent Global Variables].[ID]
Variable Name	Text		Used only for import/export
Description	Text		
Type	Integer		0 - Percent 1 - Offset 2 - Absolute
Variation	Double		

Cost Nodes

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
ParentID	Long Integer	Yes	Parent cost node ID.
Unique Name	Text	Unique	
Parent Unique Name	Text		Used only for import/export
Name	Text		
Description	Text		
Node Level	Long Integer		'Root' node is node level 0.
Display Order	Long Integer		Order applies to group of children. The first child is display order 0.
Expanded	Boolean		False - Children are not visible True - Children are visible
CostFunctionID	Long Integer		FK:[Cost Functions].[ID]
Cost Function Name	Text		Used only for import/export
CostNodeReferenceID	Long Integer		FK:[Cost Node References].[ID]

Cost Node Reference Name	Text		Used only for import//export
Value	Double		
Category	Boolean		False – Cost node True – Category node (used only by library)
Indenture Level	Text		

Cost Node References

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
CostFunctionID	Long Integer		FK:[Cost Functions].[ID]
Cost Function Name	Text		Used only for import/export
Name	Text	Unique	
Description	Text		

Cost Node User Functions

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
CostNodeID	Long Integer	Unique (1)	FK:[Cost Nodes].[ID]
Cost Node Unique Name	Text		Used only for import/export
UserFunctionID	Long Integer	Unique (1)	FK:[User Functions].[ID]

Constant Local Variables

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
CostFunctionID	Long Integer	Unique (1)	FK:[Cost Functions].[ID]

Name	Text	Unique (1)	
Cost Function Name	Text		Used only for import/export
Description	Text		
Default Value	Text		

Constant Local Variable Values

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
ConstantLocalVariableID	Long Integer	Unique (1)	FK:[Constant Local Variables].[ID]
CostNodeID	Long Integer	Unique (1)	FK:[Cost Nodes].[ID]
Value	Text		

Constant Local Variable Sensitivity

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
ConstantLocalVariableID	Long Integer		FK:[Constant Local Variables].[ID]
Cost Function Name	Text		Used only for import/export
Variable Name	Text		Used only for import/export
Description	Text		
Type	Integer		0 - Percent 1 - Offset 2 - Absolute
Variation	Double		

Time Dependent Local Variables

Name	Type	Indexed	Comments
ID	Long Integer	Primary	

CostFunctionID	Long Integer	Unique (1)	FK:[Cost Functions].[ID]
Name	Text	Unique (1)	
Cost Function Name	Text		Used only for import/export
Description	Text		
Default Value	Text		

Time Dependent Local Variable Values

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
TimeDependent LocalVariableID	Long Integer	Unique	FK:[Time Dependent Local Variables].[ID]
CostNodeID	Long Integer	Unique	FK:[Cost Nodes].[ID]
TimePointID	Long Integer	Unique	FK:[Time Points].[ID]
Value	Text		

Time Dependent Local Variable Sensitivity

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
TimeDependent LocalVariableID	Long Integer		FK:[Time Dependent Local Variables].[ID]
Cost Function Name	Text		Used only for import/export
Variable Name	Text		Used only for import/export
Description	Text		
Type	Integer		0 - Percent 1 - Offset 2 - Absolute
Variation	Double		

Sensitivity Study

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
Variable Name	Text		
Variable Type	Text		0 - None (No Variation) 1 - Constant Global 2 - Time Dependent Global 3 - Constant Local 4 - Time Dependent Local
Description	Text		
Variation Type	Integer		0 - Percent 1 - Offset 2 – Absolute
Variation	Double		

Part Trees

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
Name	Text	Unique	
Description	Text		
Expanded	Boolean		False - Children are not visible True - Children are visible
Display Order	Long Integer		The first part tree is display order 0.

Parts

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
ParentID	Long Integer		Parent part ID. –1 if top level (child of part tree node)
PartTreeID	Long Integer	Unique (1)	FK:[Part Trees].[ID]
Part Tree Name	Text		Used only for import/export

Name	Text	Unique (1)	
Part Name	Text		Used only for import/export
Description	Text		
Expanded	Boolean		False - Children are not visible True - Children are visible
Node Level	Long Integer		Top level part is node level 0.
Display Order	Long Integer		Order applies to group of children. The first child is display order 0.

Constant Part Tree Variables

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
PartTreeID	Long Integer	Unique (1)	FK:[Part Trees].[ID]
Part Tree Name	Text		Used only for import/export
Name	Text	Unique (1)	
Description	Text		
Default Value	Text		

Constant Part Tree Variable Values

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
ConstantPartTreeVariableID	Long Integer	Unique (1)	FK:[Constant Part Tree Variables].[ID]
PartID	Long Integer	Unique (1)	FK:[Parts].[ID]
Value	Text		

Time Dependent Part Tree Variables

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
PartTreeID	Long	Unique	FK:[Part Trees].[ID]

	Integer	(1)	
Part Tree Name	Text		Used only for import/export
Name	Text	Unique (1)	
Description	Text		
Default Value	Text		

Time Dependent Part Tree Variable Values

Name	Type	Indexed	Comments
ID	Long Integer	Primary	
TimeDependentPartTreeVariableID	Long Integer	Unique (1)	FK:[Time Dependent Part Tree Variables].[ID]
PartID	Long Integer	Unique (1)	FK:[Parts].[ID]
TimePointID	Long Integer	Unique (1)	FK:[Time Points].[ID]
Value	Text		

Cost Node Results

Name	Type	Indexed	Comments
CostNodeID	Long Integer	Primary (1)	FK:[Cost Nodes].[ID]
TimePointID	Long Integer	Primary (1)	FK:[Time Points].[ID]
SensitivityStudyID	Long Integer	Primary (1)	
Value	Double		
Cumulative Value	Double		

User Function Results

Name	Type	Indexed	Comments
CostNodeUserFunctionID	Long Integer	Primary (1)	FK:[Cost Node User Functions].[ID]
TimePointID	Long	Primary	FK:[Time Points].[ID]

	Integer	(1)	
SensitivityStudy ID	Long Integer	Primary (1)	
Value	Double		
Cumulative Value	Double		

Constant Part Tree Variable Results

Name	Type	Indexed	Comments
PartID	Long Integer	Primary (1)	FK:[Parts].[ID]
ConstantPartTreeVariableID	Long Integer	Primary (1)	FK:[Constant Part Tree Variables].[ID]
Part Value	Double		
Sum Value	Double		

Time Dependent Part Tree Variable Results

Name	Type	Indexed	Comments
PartID	Long Integer	Primary (1)	FK:[Parts].[ID]
TimeDependentPartTreeVariableID	Long Integer	Primary (1)	FK:[Time Dependent Part Tree Variables].[ID]
TimePointID	Long Integer	Primary (1)	FK:[Time Points].[ID]
Part Value	Double		
Sum Value	Double		

Project Options

Name	Type	Indexed	Comments
Date Format	Text		Default is "mm/yyyy"
Function Mode	Integer		0 – Expert 1 – Novice (default)
Results Numeric Format	Text		Default is "###0.0"
Perform Analysis At First Time Point	Boolean		Default is True

View Unique Name	Boolean		
View Name	Boolean		
View Indenture Level	Boolean		
View Description	Boolean		
View Cost Function	Boolean		
View Cost Function Code	Boolean		
View Cost Node Reference	Boolean		
View Cumulative Cost	Boolean		
View TimeSequenceI D	Boolean		View cumulative cost at each cost node for specified time sequence.
System Description	Text		
Compiled By	Text		
Approved By	Text		

Appendix V – Security Permissions

This appendix lists the security permissions assigned to each IccWare security group.

Privilege	**Security Group**			
	Admins	**Design IccWare**	**Modify IccWare Data**	**Read IccWare Data**
Add User	Yes	No	No	No
Delete User	Yes	No	No	No
Change User Passwords	Yes	No	No	No
Change Own Password	Yes	Yes	Yes	Yes
Secure Project	Yes	Yes	No	No
Create New Project	Yes	Yes	No	No
Add Cost Nodes	Yes	Yes	No	No
Modify Cost Nodes	Yes	Yes	No	No
Read Cost Nodes	Yes	Yes	Yes	Yes
Add Time Sequences and Time Points	Yes	Yes	No	No
Modify Time Sequences	Yes	Yes	No	No

and Time Points				
Read Time Sequences and Time Points	Yes	Yes	Yes	Yes
Add Global or Local Variables	Yes	Yes	No	No
Modify Global or Local Variables	Yes	Yes	Yes (Values only)	No
Read Global or Local Variables	Yes	Yes	Yes	Yes
Add Cost Node References	Yes	Yes	No	No
Modify Cost Node References	Yes	Yes	No	No
Read Cost Node References	Yes	Yes	Yes	Yes
Add Cost, Global or User Functions	Yes	Yes	No	No
Modify Cost, Global or User Functions	Yes	Yes	No	No
Read Cost, Global or User	Yes	Yes	Yes	Yes

Functions				
Add Sensitivity Study Variable	Yes	Yes	No	No
Modify Sensitivity Study Variable	Yes	Yes	Yes (Variation Only)	No
Read Sensitivity Study Variable	Yes	Yes	Yes	Yes
Run Analyses	Yes	Yes	Yes	Yes
Import and Export Data	Yes	Yes	No	No

Appendix VI - Installation Instructions

Overview

These instructions apply to the Windows 95/98, NT and 2000 operating systems, and Novell Netware servers. Please note that the Novell Netware instructions are applicable to installations on Netware servers NOT to Windows 95/98, NT or 2000 servers using Netware as the network protocol.

The installation instructions are categorised by installation type - standalone, network server or network client. At the end of each installation type section are notes for each particular operating system/server type (where appropriate).

Before starting the installation please ensure :

- that all other processes on the target machine have been terminated.
- that you are logged in as the system administrator.
- that you have full access to the installation (usually *Program Files*) directory on the target machine (and read/write access to the server for network client installations).
- that you read the notes appropriate to your operating system/server type at the end of each installation type section.

File permissions are discussed more fully under each installation type.

Note that the installation process takes a ‘conservative’ approach to updating system DLLs and ActiveX controls. These components will only be updated if the component version number contained in the CD-ROM installation is greater than that of the component on the target machine.

To start the installation insert the CD in the CD-ROM drive. Normally the installation will start automatically. If this is not the case then select *Run* from the Windows *Start* menu and then *Browse*. Now navigate to the CD-ROM drive, open the *disk1* folder

and select the *Setup.exe* program. Select *OK* on the *Run* dialog to start the installation.

- Now refer to the standalone installation instructions if you have a licence to install IccWare on a single machine.
- Refer to the network server installation type if you have a licence to install IccWare on a network server.
- Refer to the network client installation type if you have already installed IccWare on your network server and are now installing to a client.

Note that after completing the installation you will need to refer to the section entitled 'Obtaining Your IccWare Licence' for instructions on activating the full functionality of IccWare.

If you are installing IccWare in a network server/client configuration please install the network server copy of IccWare first and obtain the licence for this copy before installing the network client(s).

Installing on a Standalone Machine

After starting the installation process :

The *Welcome* dialog is displayed initially, select *Next* to display the *Select Setup Type* dialog.

Select the *Standalone* option from the list and then select Next to display the *Choose Destination Folder* dialog.

Select the folder (directory) in which you wish to install IccWare. This is the top-level directory of the installation and is normally *C:\Program Files*, although any directory may be chosen. This folder must be on a local hard disk drive of the machine you are installing on. Select *Next* to display the *Select Program Folder* dialog.

Enter the program folder name. This is IccWare by default, although any name may be chosen. A shortcut to the IccWare program will be created in this folder. Select *Next* to display the *Select Shortcut Options* dialog.

By default additional desktop and start menu shortcuts to the IccWare program are created. To prevent these being created de-select the check boxes. Select *Next* to display the *Select Default Paper Size* dialog.

Select either ISO A4 or US Letter as the default paper size for your reports. Select *Next* to display the *Start Copying Files* dialog.

NB: If you already have IccWare Version 2.0 installed on your machine you will be asked if you wish to overwrite your Report Generator, Import and Export databases. These contain your reports, import and export templates respectively. If you choose to overwrite your report database then your old report formats are still accessible via the new *Alternate Report Database* option in the *Report Explorer*. The old report database will be saved as *MV5LwR.rkz*.

Select *Next* to start the file copy and registration process. When this is finished the *Setup Complete* dialog will be displayed. You may be prompted as to whether you wish to reboot the machine now or later. If this prompt appears it is because another process is

using a shared DLL or ActiveX control that the installation program tried to update. The new version will be installed when the machine is rebooted.

Notes for Windows NT/2000 Users Installing on a Standalone Machine

Ensure that the IccWare user has *Change* access to the *<install directory>\Rams* directory.

The IccWare licence system for Windows NT/2000 requires a set of drivers (known as the NT Stealth drivers) to be installed in the program directory. These drivers are normally installed automatically by the installation process, however if any problems occur in this process you will be prompted to install the drivers manually. To do this select *Run* from the Windows *Start* menu and then *Browse*. Now navigate to the *<install directory>\Rams\IccWare\3.0\Program* directory and select the *setupex.exe* program. Select *OK* on the *Run* dialog to install the drivers.

Installing on a Network Server

After starting the installation process :

The *Welcome* dialog is displayed initially, select *Next* to display the *Select Setup Type* dialog.

Select the *Network Server (Windows 95 or NT)* or *Network Server (Novell Netware)* option from the list according to your server type and then select *Next* to display the *Choose Destination Folder* dialog.

Select the folder (directory) in which you wish to install IccWare. This is the top-level directory of the installation and is normally *C:\Program Files*, although any directory may be chosen. This folder must be on a local hard disk drive of the machine you are installing on. Select *Next* to display the *Select Program Folder* dialog.

Enter the program folder name. This is IccWare by default, although any name may be chosen. A shortcut to the IccWare program will be created in this folder. Select *Next* to display the *Select Shortcut Options* dialog.

By default additional desktop and start menu shortcuts to the IccWare program are created. To prevent these being created de-select the check boxes. Select *Next* to display the *Select Default Paper Size* dialog.

Select either ISO A4 or US Letter as the default paper size for your reports. Select *Next* to display the *Start Copying Files* dialog.

NB: If you already have IccWare Version 2.0 installed on your machine you will be asked if you wish to overwrite your Report Generator, Import and Export databases. These contain your reports, import and export templates respectively. If you choose to overwrite your report database then your old report formats are still accessible via the new *Alternate Report Database* option in the *Report Explorer*. The old report database will be saved as *MV5LwR.rkz*.

Select *Next* to start the file copy and registration process. When this is finished the *Setup Complete* dialog will be displayed. You

may be prompted as to whether you wish to reboot the machine now or later. If this prompt appears it is because another process is using a shared DLL or ActiveX control that the installation program tried to update. The new version will be installed when the machine is rebooted.

Notes for Users Installing on a Windows 95/98 Network Server

Ensure that all IccWare network users have *Full* access to the <*install directory*>*Rams* directory.

The IccWare licence system for Windows 95/98 requires a program *wckserve.exe* to be running in the background. If you already have a program (from Isograph or another software vendor) using the CrypKey based licence system you must install this program manually. The install script will prompt you to confirm whether you have the CrypKey licence system already installed. If you answer *No* then *wckserve.exe* will be installed automatically, if you answer *Yes* then you must follow the instructions below to complete the installation.

You must provide *wckserve.exe* with the path where the CrypKey protected applications run. Directories must be defined on command line or by setting the environment variable CKSERVE (but not both)(this is not a misprint - the environment variable is CKSERVE).

If the application(s) already installed are using the environment variable then add the IccWare program directory to the SET statement :

SET CKSERVE = *C:\App1; C:*\<*install directory*>*Rams**IccWare**3.0**Program*

If the application(s) already installed are using the command line then the *wckserve.exe* shortcut will almost certainly be in the *StartUp* program folder. Open the shortcut properties dialog and add the IccWare program directory to the *Target* :

"C:\Program Files\RAMS\Common\Program\Wckserve.exe"
C:\App1; C:\<install directory>\RAMS\IccWare\3.0\Program

If you install programs from another software vendor using the

CrypKey licence system, after installing IccWare, please be aware that they may unconditionally overwrite the existing shortcut, command line setting and/or environment variable. If you are in any doubt please consult the software vendor to determine their method of installing *wckserve.exe*.

Notes for Users Installing on a Windows NT/2000 Network Server

Ensure that all IccWare network users have *Read* access to the <*install directory*>*Rams* directory.

Ensure that all IccWare local users (that is using IccWare on the actual server machine) have *Change* access to the <*install directory*>*Rams* directory.

Ensure that all IccWare network users have *Change* access to the <*install directory*>*Rams**IccWare**3.0**Program* directory.

The IccWare licence system for Windows NT/2000 requires a set of drivers (known as the NT Stealth drivers) to be installed in the program directory. These drivers are normally installed automatically by the installation process, however if any problems occur in this process you will be prompted to install the drivers manually. To do this select *Run* from the Windows *Start* menu and then *Browse*. Now navigate to the <*install directory*>*Rams**IccWare**3.0**Program* directory and select the *setupex.exe* program. Select *OK* on the *Run* dialog to install the drivers.

Notes for Users Installing on a Novell Netware Server

Ensure that all IccWare network users have *Read, Execute* access to the <*install directory*>*Rams* directory.

Ensure that all IccWare network users have *Read, Write*, *Execute, Delete* access to the <*install directory*>*Rams**IccWare**3.0**Program* directory.

The IccWare licence system for Netware requires the driver *ckserver.nlm* to be installed. To install this driver:

Copy it to the *System* directory

On the Novell server in monitor mode, type "LOAD CKSERVER"

This is all that is required, the NLM will make sure that it is always run if the server is rebooted.

Note: Novell's Patch Level #5 for Novell 3.x. is the minimum patch level required to run CKSERVER.NLM on 3.x

Installing on a Network Client

After starting the installation process :

Before installing a network client please ensure that you have full access to the installation directory on the network server. This is normally *C:\Program Files*. After installation the file permissions can be reset on the server according to the network server installation notes.

The *Welcome* dialog is displayed initially, select *Next* to display the *Select Setup Type* dialog.

Select the *Network Client* option from the list and then select Next to display the *Choose Destination Folder on Network Client* dialog .

Select the folder (directory) in which you wish to install the lccWare client files. This is the top-level directory of the installation and is normally *C:\Program Files*, although any directory may be chosen. Select *Next* to display the *Choose Installation Folder on Network Server* dialog.

Select the folder (directory) on the network server which contains the lccWare installation. This is the top-level directory of the installation and is normally *C:\Program Files* (on the server), although any directory may be chosen. Note that the drive on the server must be mapped to a drive letter on the client. The installation directory will thus be of the form :

<Network Drive>:\<Installation Directory>

(For example G:\Program Files).

Select *Next* to display the *Select Program Folder* dialog.

Enter the program folder name. This is lccWare by default, although any name may be chosen. A shortcut to the lccWare program will be created in this folder. Select *Next* to display the *Select Shortcut Options* dialog.

By default additional desktop and start menu shortcuts to the lccWare program are created. To prevent these being created de-select the check boxes. Select *Next* to display the *Select Default Paper Size* dialog.

Select either ISO A4 or US Letter as the default paper size for your reports. Select *Next* to display the *Start Copying Files* dialog.

NB: If you already have IccWare Version 2.0 installed on your machine you will be asked if you wish to overwrite your Report Generator, Import and Export databases. These contain your reports, import and export templates respectively. If you choose to overwrite your report database then your old report formats are still accessible via the new *Alternate Report Database* option in the *Report Explorer*. The old report database will be saved as *MV5LwR.rkz*.

Select *Next* to start the file copy and registration process. When this is finished the *Setup Complete* dialog will be displayed. You may be prompted as to whether you wish to reboot the machine now or later. If this prompt appears it is because another process is using a shared DLL or ActiveX control that the installation program tried to update. The new version will be installed when the machine is rebooted.

Appendix VII - Obtaining Your LccWare Licence

Select lccWare V3.0 from the Windows *Start* menu. The program will start up in demonstration mode. Either select the *Licence* button from within the Demonstration Message Dialog that appears immediately on start-up or select the *Help, Licence* pull-down menu option to display the *Licence* dialog. Note down the site code provided in the dialog and send an email to Isograph (licence@isograph.com) containing your company details, contact name and site code. We will then provide you with a site key that will allow you to run the program according to the type of licence you have purchased. When you receive the site key from Isograph restart the lccWare program. Select the *Help, Licence* menu option to display the *Licence* dialog again, and type in the site key provided. Now select the *Update* button in the dialog. Your licence restrictions will be updated and you can use the program in your authorised mode.

If at any time you wish to transfer the licence to another computer, or are upgrading the operating system on your computer, you must contact Isograph again to receive a new authorisation key. Note that before this new key can be provided you should kill your old licence using the *Kill* button in the *Licence* dialog and provide Isograph with the confirmation code. Please ensure that you note down the confirmation code when using the *Kill* function.

Appendix VIII - Moving the Program and Licence

If you wish to move a licensed IccWare program from one directory to another or from one computer to another without having to contact Isograph then follow one of the following methods.

Direct Transfer

This method is used to move a licensed program from one local or network directory to another directory.

- Install IccWare to the new directory using the installation CD.
- Start the original program (which is currently licensed). Select the *Help, Licence* menu option to display the *Licence* dialog.
- Select *Direct Transfer* and then select the directory path for the new program location (e.g. *C:\Program Files\RAMS\IccWare\3.0\Program*) using the *Select Directory* dialog.

A single licence will be transferred to the program in the new directory.

Floppy Disk Transfer

This method is used to move a licensed program from one computer to another if the computers are not networked.

- Install IccWare on the target computer.
- Insert a floppy disk in the floppy disk drive of the target computer.
- Start the program on the target computer (it will start up in demonstration mode). Select *Licence* from the dialog that appears on start-up or alternatively select the *Help, Licence* menu option.
- The *Licence* dialog will now appear. Select *Register Transfer* .
- When you receive a message saying that the operation

was completed successfully remove the floppy disk from the floppy disk drive.

- Insert the floppy disk into the floppy disk drive of the source computer.
- Start the program on the source computer (which is currently licensed).
- Select the *Help, Licence* menu option to reveal the *Licence* dialog.
- Select *Transfer Out*.
- When you receive a message saying that the operation was completed successfully remove the floppy disk from the floppy disk drive.
- Insert the floppy disk into the floppy disk drive of the target computer.
- Start the program on the target computer (it will start up in demonstration mode). Select the *Licence* from the dialog that appears on start-up or alternatively select the *Help, Licence* menu option.
- The *Licence* dialog will now appear. Select *Transfer In*.
- When you acknowledge the message saying that the operation was completed successfully the target machine program has become licensed.

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